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UDC 577.122

ANALYSIS OF N-TERMINAL AMINO ACID SEQUENCES OF DACTYLIS GLOMERATA ALPHA-PROLAMINE COMPONENTS

Moscow BIOKHIMIYA in Russian Vol 51, No 9, Sep 86
(manuscript received 19 Nov 85) pp 1519-1522

[Article by I.O. Vvedenskaya, S.V. Shlyapnikov and A.V. Konarev, All-Union Institute of Plant Sciences imeni N.I. Vavilov, Leningrad; Institute of Molecular Biology, USSR Academy of Sciences, Moscow]

[Abstract] The automated Edman procedure was utilized in an analysis of the N-terminal amino acid sequences of the alpha$_1$ (A1), alpha$_3$ (A3) and the BP4 (rapid, fast) components of grass orchard (Dactylis glomerata) alpha-prolamine. With the exception of the residue at position 16, the sequences were identical for A1 and A3, with 29 residues analyzed in the case of A1 and 23 for A3. In addition, a similarly high degree of homology was found for 16 residues among all three of the components. Comparative evaluations revealed analogies at 8 positions between A1 and A3 of D. glomerata and those of the prolamines of Avena sativa. High-homology was also evident between the N-terminal sequences of A1, A3 and BP4 and the gamma-gliadins. These findings provided yet another proof for a common ancestral gene for this class of proteins. Figures 1; references 7: 4 Russian, 3 Western.

12172/9835
CSO: 1840/509

UDC 633.11"321":581.133.8

PRODUCTIVITY OF SPRING WHEAT IN RELATION TO REDUCED ILLUMINATION AND VARIABLE POTASSIUM LEVELS

Moscow IZVESTIYA TIMIRYAZEVSKOY SELSKOKHOZYAYSTVENNOY AKADEMII in Russian
No 2, Mar-Apr 85 (manuscript received 10 Nov 84) pp 76-81

[Article by Ye.Ye. Krastina, Laboratory of Plant Physiology]

[Abstract] Laboratory studies were conducted on the growth of Moscow-21 spring wheat (Triticum aestivum) to assess the effects of K levels under

conditions of low illumination (9 klux). The resultant data demonstrated that in aqueous nutrient media, with the concentration of K ranging from 0.5 to 3.5 mM, K had no essential effect on growth and development of the stem during the first month of growth. However, development of lateral shoots was adversely affected by the lower K concentrations, whereas grain productivity was improved in some cases by the low concentrations of K. These observations provided contrary data to the view that low conditions of illumination create a need for high K concentrations in the nutrient medium. References 17: 10 Russian, 7 Western.

12172/9835
CSO: 1840/1035

UDC 577.335+577.15+541.182.6

ACTIVITY OF PHOSPHOLIPASE A_2 FROM VENOM OF TURKESTAN GIANT HORNET (VESPA ORIENTALIS) IN HYDRATED REVERSED MICELLES OF TRITON X-100 AND PHOSPHATIDYLCHOLINE IN BENZENE

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 10, Oct 86
(manuscript received 13 Dec 85) pp 1030-1036

[Article by M.M. Rakhimov, M.U. Tuychibayev, O.N. Gorbataya, A.V. Kabanov*, A.V. Levashov* and K. Martinek*, Soil Biology Faculty, Tashkent State University; *Chemistry Faculty, Moscow State University imeni M.V. Lomonosov]

[Abstract] The activity of phospholipase A_2 (PLA) (EC 3.1.1.4) isolated from the venom of the Turkestan giant hornet (Vespa orientalis) was evaluated in a hydrated reversed micelle system formed by Triton X-100 and phosphatidylcholine in benzene. PLA retained its enzymatic activity in the micelles and hydrolyzed the substrate--phosphatidylcholine--with optimum activity at pH 7.0, vs. a pH optimum range of 8-9 for the soluble enzyme. The addition of 30 mM Ca^{2+} increased the activity 2.5-fold. Activity was also increased by increasing hydration, and by increasing the concentration of Triton X-100. The latter effect was apparently due to increased accessibility to the phosphatidylcholine substrate. These observations revealed marked differences in PLA activity from those usually observed in studies on soluble systems, and are presumably due to the enzyme's specificity for phosphatidylcholine, one of the components of the micelles. Figures 7; references 34: 22 Russian, 12 Western.

12172/9835
CSO: 1840/484

UDC 577.182.26:543.422.25

NMR ANALYSIS OF SPATIAL STRUCTURE OF GRAMICIDIN A TRANSMEMBRANOUS ION CHANNELS IN MICELLES

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 5, May 86
(manuscript received 19 Dec 85) pp 437-462

[Article by A.S. Arsenyan, I.L. Barsukov, V.F. Bystrov and Yu.A. Ovchinnikov, Institute of Bioorganic Chemistry imeni M.M. Shemyakin, USSR Academy of Sciences, Moscow]

[Abstract] The COSY and NOESY approach was used in analysis of ^1H NMR spectra of ion channels in micelles formed by the incorporation of gramicidin A (GA). The micelles were formed by the anionic detergent dodecyl sulfate in the presence of monovalent cations Li^+, Na^+,or Ti^+, resulting in the demonstration that the nature of the cation was without effect on the conformation of GA. Evaluation of CD spectra of GA in dodecyl sulfate micelles and in lysophosphatidylcholine and dipalmitoylphosphatidylcholine liposomes indicated that the ionophoretic properties of GA were identical in all three cases. The spectral data pointed to a channel consisting of a dimer represented by two right-handed single helices, $\pi_{LD}^{6.3}$, with 6.3 amino acid residues per turn, associated in N-terminal to N-terminal (head-to-head) manner; $\pi_{LD}^{\rightarrow 6.3} \pi_{LD}^{\leftarrow 6.3}$. These observations were consonant with a stable structure, with the possible changes in the torsion angles limited to ca. 30°. This value is on the order of thermal fluctuations in GA that may be expected from molecular dynamics. Figures 14; references 58: 7 Russian, 51 Western.

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UDC 577.112.856:577.354.9

EFFECTS OF GANGLIOSIDES ON BINDING OF LOW DENSITY LIPOPROTEINS (LDL) TO HEPATOMA CELLS

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 5, May 86
(manuscript received 11 Nov 85) pp 463-471

[Article by N.V. Prokazova, I.A. Mikhaylenko, S.N. Preobrazhenskiy, V.O. Ivanov, V.P. Shevchenko, V.S. Repin and L.D. Bergelson, All-Union Cardiological Scientific Center, USSR Academy of Medical Sciences, Moscow]

[Abstract] Mouse ascitic hepatoma 22a (MAH) cells were used as a model system to assess the binding of LDL and the effects of gangliosides on the binding kinetics. The kinetic data, based on radioimmunoassay binding

studies, demonstrated high affinity binding to MAH cells with an association constant of 1.3×10^8 M^{-1}. The binding was analogous to that observed for human fibroblasts. Treatment of MAH cells with neuraminidase diminished binding, and saturation of such cells with gangliosides led to recovery of binding activity. Free gangliosides functioned as competitive inhibitors of binding, with the degree of inhibition dependent on the structure of the ganglioside. This study demonstrated specific receptors on MAH cells for LDL, and suggested that gangliosides may exert a similar regulatory function in vivo. Figures 7; references 31: 5 Russian, 26 Western.

12172/9835
CSO: 1840/479

UDC 577.152.361*3:577.322.4:57.083.3

LOCALIZATION OF CALMODULIN-BINDING SITES ON Ca^{2+},Mg^{2+}-ATPase OF HUMAN ERYTHROCYTES

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 5, May 86 (manuscript received 15 Dec 85) pp 481-488

[Article by N.N. Modyanov, M.I. Shakhparonov and Ye.I. Yemelyanenko, Institute of Bioorganic Chemistry imeni M.M. Shemyakin, USSR Academy of Sciences, Moscow]

[Abstract] Tryptic hydrolysis and gel fractionation were employed to obtain various peptide fragments of Ca^{2+},Mg^{2+}-ATPase derived from human erythrocytes in order to assess calmodulin-binding sites. The following peptides were isolated: 53, 33.5, 76, 28, and 82 kdaltons. The 53, 82, 76, and 28 kdalton peptides had a blocked N-terminal end, while the N-terminal amino acid of the 33.5 kdalton peptide was identified as glutamine. Antibodies raised against the 53 and 28 kdalton peptides and their mixture in rabbits reacted with themselves and cross-reacted with the 53 and 76 kdalton peptides, but not with the 33.5 kdalton peptide. In addition, the antibodies also inhibited calmodulin-dependent activation of ATP hydrolysis in erythrocyte membranes. Overlap analysis led to the conclusion that the exposed N-terminal end of the enzyme contains the active site for ATP hydrolysis and one calmodulin-binding region. The second calmodulin-binding region was ascribed closer to the C-terminus in the 33.5 kdalton peptide fragment which is imbedded in the erythrocyte membrane. Figures 5; references 21 (Western).

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UDC 577.352.332:577.152.361*3

DETERMINATION OF THREE-DIMENSIONAL STRUCTURE OF BETA-SUBUNIT OF Na^+,K^+-ATPase BY ELECTRON MICROSCOPY

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 5, May 86
(manuscript received 26 Mar 86) pp 537-541

[Article by Yu.A. Ovchinnikov, V.V. Demin, A.N. Barnakov, Ye.A. Svetlichnyy, N.N. Modyanov and K.N. Dzhandzhugazyan, Institute of Bioorganic Chemistry imeni M.M. Shemyakin, USSR Academy of Sciences, Moscow]

[Abstract] Description is provided of electron microscopic techniques employed to study the three-dimensional structure of Na^+,K^+-ATPase isolated from swine kidneys, through detailed evaluation of the beta-subunit. Prolonged incubation of the beta-subunit at 4°C in the presence of Mg^{2+} or Ca^{2+} resulted in the formation of two-dimensional crystals. The crystals formed under the influence of Mg^{2+} belonged to the p21 groups with the following elementary parameters: a = 77 Å, b = 177 Å, and γ = 63°. At a scanning angle of $\pm$60° a three-dimensional structure for the beta-subunit was proposed with a resolution of ~20Å. A characteristic feature of the structure of the beta-subunit crystals was the absence of contact regions between neighboring subunits. The intact enzyme appears to have two protomers with a contact region of ca. 40 Å, which is asymmetrical relative to the cell membrane. It appears that the formation of Na^+,K^+-ATPase dimers is, therefore, dependent on the alpha-subunits rather than the beta-subunits, and that the contact region is on the internal side. The hydrophilic domains of the beta-subunits are located on the supramembranous portions of the enzyme molecule. Figures 3; references 16: 5 Russian, 11 Western.

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UDC 577.152.361*3:577.151.34:577.112(4+5)

Na^+,K^+-ATPase of SWINE KIDNEYS. PART 4. STRUCTURE OF ALPHA-SUBUNIT ACTIVE SITE FRAGMENT MODIFIED BY ALKYLATING ATP ANALOG

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 8, Aug 86
(manuscript received 10 Mar 86) pp 858-868

[Article by K.N. Dzhandzhugazyan, S.V. Lutsenko and N.N. Modyanov, Institute of Bioorganic Chemistry imeni M.M. Shemyakin, USSR Academy of Sciences, Moscow]

[Abstract] The structural parameters of the active site on the alpha-subunit of Na^+,K^+-ATPase of swine kidney were further defined through alkylation by an ATP analog, (gamma[4-(N-2-chloroethyl-N-methylamino)]-benzylamide-ATP. Reaction of the enzyme with the alkylating analog led to

a marked loss of enzymatic activity. Enzymatic digestion of the alkylated enzyme and peptide resolution studies led to identification of the alkylated fragment as Ala-Val-Thr-Gly-Asp-Gly-Val-Asn-Asp-Ser-Pro-Ala-Leu. This sequence corresponded to the 706-718 amino acid sequence of the alpha-subunit. Alkylation occurred at either the 710 or the 714 Asp residue. This fragment represented a previously unknown component of the active site of the enzyme and lies in one of the regions showing the greatest degree of homology of all known E_1-E_3-ATPases. Figures 6; references 21: 4 Russian, 17 Western.

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UDC 577.112(4+7):577.354.23

CHEMICAL MODIFICATION OF NATIVE RHODOPSIN-TRANSDUCIN COMPLEX BY N-ETHYLMALEIMIDE

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 7, Jul 86 (manuscript received 5 Mar 86) pp 661-667

[Article by M.I. Kolosov and V.L. Voyeykov, Biology Faculty, Moscow State University imeni M.V. Lomonosov]

[Abstract] In order to study the functional role of sulfhydryl groups of rhodopsin and transducin from bovine outer rod-segments in the rhodopsin-transducin complexes formed as a result of illumination, the effects of alkylation of these groups by N-ethylmaleimide were evaluated. The study revealed two functional categories of sulfhydryl groups. Alkylation of one category on transducin led to inhibition of the GTPase activity of transducin, and prevented GTP-dependent dissociation of the complex. These changes were evident with 0.02-0.05mM N-ethylmaleimide. At higher N-ethylmaleimide (1 mM) a second category of sulfhydryl groups were alkylated on both transducin and rhodopsin, with the alkylated rhodopsin failing to react with transducin for complex formation. The second type of functional sulfhydryl groups were, therefore, less accessible to alkylation. The rhodopsin molecule was thus shown to contain cysteine residues which, when alkylated prevented association with transducin. Figures 5; references 16: 3 Russian, 13 Western.

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UDC 576.5:577.352.335

LIPOSOME SURFACE -IMMOBILIZED CONCANAVALIN A: DIFFERENCES IN BINDING TO NORMAL AND TRANSFORMED MOUSE FIBROBLASTS

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 7, Jul 86
(manuscript received 30 Jan 86) pp 674-684

[Article by A.A. Bogdanov, L.V. Gordeyeva*, L.B. Margolis* and V.P. Torchilin, Institute of Experimental Cardiology, All-Union Cardiological Scientific Center, USSR Academy of Medical Sciences, Moscow; *Inter-Faculty Special Problems Scientific Research Laboratory of Molecular Biology and Bioorganic Chemistry imeni A.N. Belozerskiy, Moscow State University imeni M.V. Lomonosov]

[Abstract] Fluorescein-labeled concanavalin A (ConA) bound to liposome surface was used to assess its binding to normal and transformed mouse fibroblasts. Studies with normal embryonic fibroblasts demonstrated that ca. 70% of the binding was due to reaction of ConA with specific receptors on the fibroblasts. Studies with transformed murine fibroblasts (L cells) showed a 2- to 2.5-fold increase in binding. Furthermore, short-term treatment of the normal cells with trypsin led to a marked increase in the binding of the ConA-liposome conjugate. Preincubation of the cells with free ConA led to a 72% decrease in binding of the conjugate. These observations indicated that the ConA-liposome-cell system reproduces the basic characteristics of cell-to-cell binding via ConA and may be used for analysis of cell-lectin interactions. Figures 5; references 28: 1 Russian, 27 Western.

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UDC 577.352.4

EFFECTS OF POLYCATIONS ON PERMEABILITY OF ARTIFICIAL PHOSPHOLIPID MEMBRANES

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 7, Jul 86
(manuscript received 29 Dec 85) pp 697-703

[Article by O.O. Maksimenko, N.N. Ivanov, M.M. Feldshteyn, A.Ye. Vasilyev, N.A. Plate and V.P. Torchilin, All-Union Cardiological Scientific Center, USSR Academy of Medical Sciences, Moscow]

[Abstract] In order to better understand the effects of various polycations on membrane permeability, studies were conducted on the permeability effects of polydimethylaminoethylmethacrylate (PDAEM) on liposomes containing encapsulated 6-carboxyfluorescein. The effects of PDAEM were either to increase or decrease permeability, depending on the pH and the lipid composition of the liposomes. In studies with liposomes formed from dipalmitoylphosphatidylcholine PDAEM diminished permeability, whereas incorporation of 10% dipalmitoylphosphatidic acid resulted in an increase in permeability on exposure

to the polyelectrolyte. The effects of PDAEM on liposomes formed from egg phosphatidylcholine were also to increase permeability and release the dye, with the maximum increase seen within the initial 15-30 min of exposure. The assumed mechanism of action of PDAEM evidently involved formation of charged phospholipid clusters due to electrostatic interaction of oppositely-charged groups on PDAEM and the surface of the liposomes. Figures 5; references 12: 5 Russian, 7 Western.

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UDC 577.352:543.422.27

REACTION OF SPIN-LABELED ANALOG OF CYTOCHROME P-450 SUBSTRATE WITH LIPOSOMES AND MICROSOMES

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 7, Jul 86
(manuscript received 30 Jul 85) pp 720-729

[Article by T.N. Subkhankulova, V.V. Lyakhovich, V.A. Reznikov*, V.I. Yedinova** and L.M. Vayner**, Institute of Clinical and Experimental Medicine, Siberian Department, USSR Academy of Medical Sciences, Novosibirsk; *Novosibirsk Institute of Organic Chemistry and **Institute of Chemical Kinetics and Combustion, Novosibirsk, Siberian Department, USSR Academy of Sciences]

[Abstract] A spin-labeled lipophilic,alkylating analog of a cytochrome P-450 substrate was synthesized with a stable nitroxyl radical (2-hexyl-2,3,5,5-tetramethyl-4-(3-iodo-2-oxopropylidine)-imidazolidine-1-oxyl; RI) to study its reaction with phosphatidylcholine liposomes and rat-liver microsomes. RI was found to bind to microsomal cytochrome P-450 as a type I substrate (aniline, aminopyrine), which inhibits microsomal oxidation of this class of substrates. The covalent binding and inhibition of RI did not involve inhibition of NADPH-cytochrome P-450 reductase and conversion of P-450 to P-420. ESR analysis of the partition coefficients for RI between the aqueous and lipid phases indicated that the use of liposome-enclosed cytochrome P-450 inhibitors in vivo may be an efficient method for introducing such alkylating agents into the liver. Such agents may prolong activity of drugs that are subject, under normal conditions, to degradation by the hepatic microsomal monooxygenase system. Figures 8; references 30: 14 Russian, 16 Western.

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MONOCLONAL ANTIBODIES AGAINST GTP-BINDING PROTEIN FROM BOVINE RETINA

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 12, No 3, Mar 86
(manuscript received 23 Jul 85) pp 309-315

[Article by O.G. Shamborant, M.I. Kolosov, R.G. Vasilov, V.M. Lipkin and Yu.A. Ovchinnikov, Institute of Bioorganic Chemistry imeni M.M. Shemyakin, USSR Academy of Sciences, Moscow]

[Abstract] Five monoclonal antibodies were prepared against the GTP-binding protein (transducin) isolated from bovine retina, and analyzed for specificity. Immunoblotting and immunoenzyme analytical procedures resulted in the demonstration that two of the monoclonal antibodies (designated A3G7 and A3C10) recognized linear antigenic determinants on the alpha-subunit of transducin. Two antibodies were specific against the gamma-subunit, and one monoclonal antibody reacted only with native transducin. The GTPase activity of transducin was inhibited only by the A3G7 and A3C10 antibodies. These findings demonstrated the preparation of specific antibodies against the various subunits of transducin, and their potential usefulness in functional analysis of transducin. Figures 3; tables 1; references 18 (Western).

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UDC 532.26:577.352.6

X-RAY ANALYSIS ON CYTOTOXIN-INDUCED PHASE SEPARATION OF LIPIDS IN MODEL MEMBRANES

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 6, Jun 86
(manuscript recevied 30 Dec 85) pp 621-626

[Article by Yu.M. Lvov, M. Oymatov, T.F. Aripov and L.A. Feygin, Institute of Crystallography, USSR Academy of Sciences, Moscow; Institute of Bioorganic Chemistry, Uzbek SSR Academy of Sciences, Tashkent]

[Abstract] Two cytotoxins (V_C1 and V_C5) isolated from the venom of the Central Asian cobra (Naja naja oxiana) were investigated for their effects on bilayer lipid membranes prepared from dipalmitoylphosphatidylcholine (I) and from I + phosphatidic acid. X-ray scattering analysis demonstrated that introduction of the cytotoxins induced a lateral phase separation of the lipids. At temperatures above that for phase transition (41.5°C) a fraction of the lipid molecules remained in the gel phase (27 lipid molecules/protein molecule at 46°C; 13 lipid molecules/protein molecule at 55°C). The observed effects of the cytotoxins were apparently due to the structure-forming effects of the hydrophobic portion of the protein molecules on the adjacent carbohydrate chains of the lipids. Figures 3; references 15: 7 Russian, 8 Western.

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UDC 577.112.856.083:543.544

SYNTHESIS AND PROPERTIES OF AFFINITY SORBENTS FOR REMOVAL OF ATHEROGENIC LIPOPROTEINS

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 12, No 10, Oct 86 (manuscript received 22 Oct 85; in final form 21 Mar 86) pp 1391-1395

[Article by I.P. Andrianova, A.B. Rabovskiy, V.V. Zuyevskiy, M.V. Tsybulskaya, N.A. Samoylova*, Yu.A. Davidovich* and S.V. Rogozhin*, Scientific Research Institute of Physicochemical Medicine, RSFSR Ministry of Health, Moscow; *Institute of Heteroorganic Compounds imeni A.N. Nesmeyanov, USSR Academy of Sciences, Moscow]

[Abstract] An affinity sorbent was prepared from a copolymer of maleic anhydride and N-vinylpyrrolidone, with digitonin coupled to the copolymer via its hydroxyl gorups to the maleic anhydride monomer via ester bonds. The adsorbent was found effective in extracting cholesterol lipoprotein complexes, with the process unaffected by the presence of heparin. In vivo trials on rabbits with experimental hypercholesteremia demonstrated that 30 min extracorporeal perfusion via the adsorbent led to a 2-fold reduction in blood cholesterol representing the removal of 200 mg of cholesterol per animal. These observations point to the potential clinical usefulness of hydrophilic copolymers with immobilized digitonin for the removal of atherogenic cholesterol complexes from plasma. Figures 2; references 16; 7 Russian, 9 Western.

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INTERPRETATION OF ^{1}H NMR DATA ON CYCLIC ANALOG OF KALLIDIN IN SOLUTION

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 12, No 10, Oct 86 (manuscript received 20 Jan 86; in final form 5 Mar 86) pp 1317-1328

[Article by Yu.B. Saulitis, E.E. Liyepinsh, F.K. Mutulis and G.I. Chipens, Institute of Organic Synthesis, Latvian SSR Academy of Sciences, Riga]

[Abstract] An analysis based on two-dimensional COSY and NOESY spectra was used in the interpretation of ^{1}H NMR data on [cyclo(10→1$^{\varepsilon}$)]-kallidin (cyclo-KL) in $(CD_3)_2SO$ and H_2O solutions. In $(CD_3)_2SO$, cyclo-KL was found to exist in 3 conformational forms (I, II, and III), in relative concentrations of 25, 35 and 40%. The sequence of transitions among the three cis-trans isomers followed the $II \gtrless I \gtrless III$ scheme. Cyclo-KL isomer I has all of its peptide bonds in the trans conformation, in isomer II the Pro^3-Pro^4 bond is cis, and in III the Arg^2-Pro^3 bond is in the cis conformation. The free energy of activation (303 K) for the cis-trans isomerization in going from

II to I was calculated at 73.2 kJ/mole·K, and that in going from I to III (353 K) was established at 81.6 kJ/mole·K. DMSO titration demonstrated that in H_2O the respective concentrations of I, II and III isomers were 45, 25 and 30%. Figures 8; references 11: 2 Russian, 9 Western.

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UDC 577.322/5:591.145.2-546:543.422.25

^1H NMR STUDIES ON SOLUBLE STRUCTURE OF BUTHUS EUPEUS NEUROTOXIN M_9

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 12, No 10, Oct 86 (manuscript received 2 Apr 86) pp 1306-1316

[Article by V.S. Pashkov, N.A. Khoang, V.N. Mayorov and V.F. Bystrov, Institute of Bioorganic Chemistry imeni M.M. Shemyakin, USSR Academy of Sciences, Moscow]

[Abstract] 2D ^1H NMR analysis was conducted on the spatial structure of the major chain of Buthus eupeus neurotoxin M_9, consisting of 66 amino acids and containing 4 S-S bonds. In an acidic medium, the chain was found to exist as a right-handed alpha-helix (residues 22-31) and an antiparallel beta-pleated sheet (residues 1-5, 46-52, 35-40), with all 5 Xxx-Pro bonds in the trans-configuration. Comparison of the spatial structure of M_9 with the v-3 toxin of Centruroides sculpturatus (65 amino acids) and the short I_5A toxin of B. eupeus (35 amino acids) demonstrated overall similarity with the former and some similarity with some secondary structural elements of the latter. These differences and similarities evidently account for similar toxic effects of M_9 and v-3, and the fact that I_5A, in distinction to M_9 and v-3, is toxic only for insects. Figures 9; references 28: 3 Russian, 25 Western.

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COMPLETE AMINO ACID SEQUENCE OF Os-1 NEUROTOXIN OF VENOM OF BLACK CENTRAL ASIAN SCORPION ORTHOCHIRUS SCROBICULOSUS

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 12, No 5, May 86 (manuscript received 21 Oct 85) pp 581-590

[Article by N.A. Potapenko, T.M. Volkova, A.F. Garsia, T.G. Galkina, I.Ye. Dulubova and Ye.V. Grishin, Institute of Bioorganic Chemistry imeni M.M. Shemyakin, USSR Academy of Sciences, Moscow]

[Abstract] Standard techniques of peptide chemistry were employed to determine the amino acid sequence of the neurotoxic component, Os-1, of the venom obtained from the black Central Asian Scorpion Orthochirus scrobiculosus. The extreme toxicity of Os-1 for the mammalian organism is indicated by an LD_{50} value of 107.5 μg/kg for mice. The peptide was established to consist of 66 amino acids with 4 intramolecular disulfide bonds. The structural homology of this toxin was on the order of 50% with the Os-3 toxin of B. eupeus. Marked differences were evident in the 39-43 positions, where the sole methionine residue is located. This may account for the high toxicity of Os-1. Figures 5; references 16: 7 Russian, 9 Western.

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SYNTHESIS AND STUDIES ON ANALOGS OF DES-MET^5-[D-ALA^2]ENKEPHALINAMIDE

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 12, No 5, May 86 (manuscript received 12 Jul 85; in final form 29 Dec 85) pp 591-598

[Article by G.P. Vlasov, V.A. Gusel, N.Yu. Kozhevnikova, V.N. Pavlov, N.G. Illarionova, I.B. Ditkovskaya, Ye.N. Krasnikova, M.Yu. Dorosh, Yu.B. Moskvicheva, I.G. Denisov and O.S. Veselkina, Institute of High MOlecular Weight Compounds, USSR Academy of Sciences, Leningrad]

[Abstract] An analysis was conducted on the effects of N- and C-terminal insertions of oligoalanine residues into des-Met^5[D-ala^2]-enkephalinamide. The derivatives were synthesized by a solid-phase approach using Sephadex LH-20 as the carrier. Studies on rats demonstrated that administration of the C-end oligoalanine analogs into the brain ventricles (5-200 μg) had a greater analgesic effect than the N-terminal analogs. In the case of both types of derivatives the effects were significantly mitigated or entirely abolished on intraperitoneal administration. However, on intraperitoenal administration, all of the analogs induced hyperthermia. The active analogs

were also demonstrated to react with μ-type opiate receptors in the intestinal tracts of guinea pigs. Furthermore, analysis of CD spectra demonstrated that the C-analogs were quite similar to the basic amide and [met^5]enkephalin, whereas the N-derivatives showed considerable dissimilarity. Figures 3; references 10: 5 Russian, 5 Western.

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UDC 577.152.199.2'145

BACTERIAL LUCIFERASE AS INDICATOR OF INSECT PHEROMONES

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 12, No 5, May 86 (manuscript received 12 May 85; in final form 1 Aug 85) pp 633-639

[Article by A.D. Ismailov, B.G. Kovalev*, G.N. Sakharov, V.V. Strelskiy, V.S. Danilov and N.S. Yegorov, Moscow State University imeni M.V. Lomonosov; *All-Union Scientific Research Institute of Biological Plant Protection, Kishinev]

[Abstract] Bioluminescent assays were designed for the use of bacterial luciferase for the detection of insect pheromones. The systems utilizing V. harveyi and Vibrio fischeri luciferases had threshold sensitivities for C_{16}-unsaturated aldehyde pheromones of 10 and 100 pg per milliliter. The analytical procedure required only 1 min for analysis, with factors such as chain length, and the position and number of double bonds in the pheromones of the oak silkworm and the cotton-ball worm affecting luciferase-pheromone binding. Tetradecanal was the most active of the saturated aldehydes, and isomers with 16 carbon atoms exhibited the greatest activity among the monoene and diene aldehydes. Both emission and quenching studies were foundtto provide adequate information for highly sensitive assays for the pheromones derived from a single female oak silkworm (Autheraea pernyi). Figures 5; references 21: 5 Russian, 6 Western.

12172/9835
CSO: 1840/441

UDC 577.123

ACTIVATION AND STABILIZATION OF SHIGELLA SONNEI 47 DNA-METHYLASES DURING FRACTIONATION, PURIFICATION AND STORAGE

Moscow BIOKHIMIYA in Russian Vol 51, No 8, Aug 86 (manuscript received 21 Oct 85) pp 1369-1376

[Article by S.V. Suchkov, N.G. Lopatina, Ye.Ye. Arutyunyan, I.I. Nikolskaya and S.S. Debov, Scientific Research Institute of Medical Enzymology, USSR Academy of Medical Sciences, Moscow]

[Abstract] A comparative analysis was conducted on the activation and stabilization of the various fractions of DNA-methylase derived from Shigella sonnei 47 by column chromatography and isoelectric focusing. The optimum buffer for the isolation of the enzyme was represented by 10 mM Na-phosphate buffer, pH 7.4, with replacement of Na^+ by K^+ resulting in a 15-25% loss of activity in the total and cytosine and adenine DNA-methylase fractions. Of all the divalent cations, only Ca^{2+} was found to activate the DNA-methylases, with a significant stabilizing effect exerted by albumin. Glycerol was ineffective as a stabilizing agent. With one exception, protease inhibitors have no effect on DNA-methylase activity. Storage of the different enzyme fractions at 4°C was accompanied by fluctuations in activity, which were apparently due to conformational factors on reaction with substrate. Figures 4; references 25: 9 Russian, 16 Western.

12172/9835
CSO: 1840/508

UDC 578.233.22:577.352.42

EFFECT OF GANGLIOSIDES ON BINDING AND FUSION OF INFLUENZA VIRUS WITH LIPOSOMES

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 3, Mar 86 (manuscript received 9 Sep 85) pp 229-235

[Article by V.A. Slepushkin, A.I. Starov, V.B. Grigoryev, A.B. Imbs, Yul.G. Molotkovskiy, A.G. Bukrinskaya and L.D. Bergelson, Institute of Virology imeni D.I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow; Institute of BioorganichChemistry imeni M.M. Shemyakin, USSR Academy of Sciences, Moscow]

[Abstract] Ganglioside G_{T1b} partakes in reception of influenza virus (IV) assuring its penetration into host cells. In this process, G_{T1b} converts to G_{D1b} ganglioside which is also capable of inducing virus penetration into cells. This study covered the interaction of IV with phospholipid liposomes containing various gangliosides and the effect of virus on glucose penetration of such liposomes. It was shown that the specificity of binding the virus to these liposomes depended on the structure of oligosaccharide chain; the highest binding constant was obtained for G_{T1b}.

G_{M1}, which did not promote virus penetration, had no effect on binding to liposomes. The virus seemed to increase permeability of liposomes with G_{M1} ganglioside but showed no influence on G_{T1b} or G_{D1b} liposomes. A conclusion is expressed that increased permeability of liposomal membrane under the influence of influenza virus does not result from the fusion process but is due to the lipid membrane structure damage. Figures 2; references 22: 6 Russian, 16 Western (2 by Russian authors).

7813/9835
CSO: 1840/477

UDC 577.354.9

EFFECT OF SYNTHETIC ANTIOXIDANT ON COMPLEX-FORMING PROCESS OF LIGANDS WITH MEMBRANE-BOUND AND SOLUBILIZED OPIOID RECEPTORS OF RAT BRAIN

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 3, Mar 86 (manuscript received 2 Aug 85) pp 261-265

[Article by A.P. Khokhlov, K.N. Yarygin* and N.N. Yurchenko*, Institute of Chemical Physics, USSR Academy of Sciences, Moscow; *All Union Cardiological Scientific Center, USSR Academy of Medical Sciences, Moscow]

[Abstract] Activity of various receptors depends on the lipid component of neuron membranes. The question of how synthetic antioxidants achieve their biological effect on the activity of neurons remains unanswered. In this work, in vitro effect of synthetic antioxidant phenozan-1K on the complex formation of specific binding of naloxon and [D-Ala^2, Leu^5, Arg^6]-encephalin was studied both with membrane-bound and with solubilized opioid receptors in rat brain. It was shown that phenozan-1K affects the above process by gradual redistribution of physical-chemical characteristics of phospholipids in the membrane bilayer which comprises the opioid receptor complex. This in turn leads to conformational changes in protein and hydrophobic portion of the receptor with resulting change of the activity of receptor portion responsible for binding. Easier access of the antioxidant to the hydrophobic portion of the receptor complex leads to significant acceleration of this process. Figures 3; references 15: 8 Russian, 7 Western.

7813/9835
CSO: 1840/477

UDC 541.144.7

PROPERTIES OF HIGH-POTENTIAL CYTOCHROME c HEMES IN RHODOPSEUDOMONAS VIRIDIS REACTIVE CENTERS

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 9, Sep 86
(manuscript received 10 Feb 86) pp 885-889

[Article by S.M. Dracheva, L.A. Drachev, S.M. Zaberezhnaya*, A.A. Konstantinov, A.Yu. Semenov and V.P. Skulachev, Interfaculty Scientific Research Problem Laboratory of Molecular Biology and Bioorganic Chemistry imeni A.N. Belozerskiy, Moscow State University imeni M.V. Lomonsov; *Institute of Soil Management and Photosynthesis, USSR Academy of Sciences, Pushchino, Moscow Oblast]

[Abstract] In previous works, it was proposed that high potential hemes serve as direct electron donors for the bacteriochlorophylddimer, functioning in the chain of cyclic electron transport while the low potential pair binds photochemical reaction to oxidation of substrates. In this work, it was shown that two high potential cytochrome c hemes in the reaction centers of Rps. viridis are indeed not equivalent, differing by their redox potentials, optical absorption spectra and kinetics of light-induced oxidation. The direct electron donor for $P\text{-}960^+$ is the heme with E_c = 380 mV and α-band maximum of 559 nm (with a shoulder at 553 nm); the second high potential heme with E_c = 310 mV and a maximum at 556 nm transmits $P\text{-}960^+$ electrons through C-559. It appears plasible that C-559 heme is the iron-porphyrin group located closest to bacteriochlorophyl dimer in the tridimensional model of these reaction centers. Figures 3; references 15: 2 Russian, 13 Western (1 by Russian authors).

7813/9835
CSO: 1840/483

UDC 577.113.6:542.95

COMPLETELY AUTOMATED SYNTHESIS OF OLIGODESOXYRIBONUCLEOTIDES BY PHOSPHOTRIESTER METHOD ON 'VICTORIA-4M' SYNTHESIZER

Kiev BIOPOLIMERY I KLETKA in Russian Vol 2, No 6, Nov-Dec 86
(manuscript received 28 Dec 85) pp 311-316

[Article by S.M. Gryaznov, V.K. Potapov, V.V. Gorn, V.F. Zarytova, Yu.G. Sredin, G.A. Potemkin and Z.A. Shabarova, Moscow State University imeni M.V. Lomonosov; Institute of Bioorganic Chemistry, Siberian Department of USSR Academy of Sciences, Novosibirsk; Special Design Technological Office for Special Electronics and Analytical Machine Construction, Siberian Department of USSR Academy of Sciences, Novosibirsk]

[Abstract] A new solid phase synthesizer "Victoria-4M" is described. An innovation over model 3M is the mixing chamber into which nucleotide or

nucleoside components, TPS and nucleophilic acatalysts are carefully measured out, mixed and then introduced into the reactor with the polymer carrier. A second improvement is separation of the catalyst for storage and careful determination of the quantity to be used at the proper time. Four containers for nucleotide reagents are available making it possible to work with monomer components. Styrene-teflon copolymer or silochrome C-80 were used as polymer supports. Average yield for each step was in the range of 57-80%. Figure 1; references 10: 7 Russian, 3 Western.

7813/9835
CSO: 1840/497

UDC 541.69

REACTION OF ALKYLATING OLIGONUCLEOTIDE DERIVATIVES WITH MOUSE FIBROBLASTS

Kiev BIOPOLIMERY I KLETKA in Russian Vol 2, No 6, Nov-Dec 86
(manuscript received 15 Nov 85) pp 323-327

[Article by V.V. Vlasov, O.Ye. Gorokhova, Ye.M. Ivanova, I.V. Kutyavin, L.V. Yurchenko, L.A. Yakubov, M.N. Abdukayumov and Yu.S. Skoblov, Institute of Bioorganic Chemistry, Siberian Department of USSR Academy of Sciences, Novosibirsk; Experimental Unit, Institute of Nuclear Physics, UzSSR Academy of Sciences, Tashkent]

[Abstract] Highly specific interaction of nucleic acids with complementary oligonucleotides may lead to directed action on the functions of nucleic acids based on reactive oligonucleotide derivatives complement to nucleotide sequences in DNA or RNA. Binding covalently with nucleic acids, these derivatives would block their functions. Interaction of alkylating derivatives of oligonucleotides carrying a residue of aromatic 2-chloroethylamine on the 5'-terminal phosphate with cells was investigated using transplantable mouse fibroblast cell culture L929. It was shown that aromatic radicals substantially increased the ability of oligonucleotide to bind to cells, reaching a plateau within 2 hrs, the height of which was the function of the concentration of oligonucleotide derivative in the medium. The principal part of oligonucleotide derivative bound to cells appeared inside these cells (including nucleus) effectively modifying cellular biopolymers. They enter the cells via the mechanism of endocytosis; they are stable in cells long enough to complete their chemical reactions necessary for the modification of biopolymers. Figures 2; references 11: 7 Russian, 4 Western.

7813/9835
CSO: 1840/497

UDC 577.115'314:616-006.487

LIPOSOMAL MODIFICATION OF LIPID COMPOSITION OF NEUROBLASTOMA C1300 CELLS

Kiev UKRAINSKIY BIOKHIMICHESKIY ZHURNAL in Russian Vol 58, No 1, Jan-Feb 86 (manuscript received 19 Nov 84) pp 39-43

[Article by N.M. Gulaya, G.L. Volkov, N.N. Govseyeva and I.P. Artemenko, Institute of Biochemistry imeni A.V. Palladin, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] Studies were conducted with neuroblastoma C1300 cells, induced to differentiation by 5'-bromodeoxyuridine, to determine changes in lipid composition following incubation with liposomes. The C1300 cells were incubated with lecithin-cholesterol (1:1) liposomes for 1 h at 37°C, which resulted in an increase in total cell cholesterol by 60%. The increase in free cholesterol was on the order of 43%, and of cholesterol esters, 100%. Incubation of the cells with lecithin liposomes resulted in a reduction in total cellular cholesterol by 50%, as well as in a reduction in free cholesterol by 40% and of its esters by almost 90%. In the cells incubated with the cholesterol-lecithin liposomes the polyunsaturated fatty acids in cellular lecithin increased, whereas incubation with lecithin liposomes resulted in an increase in the relative concentration of saturated fatty acids. Cells with modified lipid composition retained viability for 60-90 min, indicating the utility of neuroblastoma C1300 cells in studies on cell function in relation to lipid composition. Figures 1; references 7: 2 Russian, 5 Western.

12172/9835
CSO: 1840/498

UDC 577.352.4:577.115'314:616-006.487

EFFECTS OF LIPID COMPOSITION OF NEUROBLASTOMA C1300 CELLS ON FUNCTION OF RAPID SODIUM CHANNELS

Kiev UKRAINSKIY BIOKHIMICHESKIY ZHURNAL in Russian Vol 58, No 1, Jan-Feb 86 (manuscript received 30 Apr 85) pp 44-48

[Article by N.M. Gulaya, G.L. Volkov, V.K. Lishko, N.N. Govseyeva and Ye.P. Klimenko, Institute of Biochemistry imeni A.V. Palladin, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] Studies were conducted on the rate of $^{86}Rb^{+}$ release from differentiated neuroblastoma C1300 cells following incubation of the cells with lecithin-cholesterol (1:1) liposomes for 1 h at 37°C. Incubation of the cells with the liposomes raised the concentration of total cholesterol by 60%, concomitantly with the detection of cellular lysolecithin and an increase in polyunsaturated fatty acids in lecithin molecules. Addition

of 690 μg/ml veratrine to cholesterol-enriched cells resulted in a 5-fold increase in Rb^+ release, while the veratrine-incuded release from control cells was enhanced 3.5-fold. The effects of veratrine were dose-related. In both cases the effect was abolished by tetrodotoxin. Determinations of the energies of activation for the extrusion of Rb^+ by intact cells and cholesterol-enriched cells were 7.0 and 8.5 kcal/mole, respectively. The corresponding activation energies for intact cells + veratrine and cholesterol-enriched cells + veratrine were 18.91 and 18.85 kcal/mole, respectively. These observations demonstrated that the change in the lipid composition of the cells had a profound effect on the sodium channels, as measured by the release of $^{86}Rb^+$. The absence of an inflection point on the Arrhenius plots suggested that conformational changes in the channels did not take place. Figures 4; references 14: 3 Russian, 11 Western.

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CSO: 1840/498

UDC 577.352:465

ENERGY PROFILE OF ALPHA-LATROTOXIN-FORMED CHANNELS IN BILAYER PHOSPHOLIPID MEMBRANES

Kiev UKRAINSKIY BIOKHIMICHESKIY ZHURNAL in Russian Vol 58, No 1, Jan-Feb 86 (manuscript received 20 Jun 85) pp 48-56

[Article by A.I. Chanturiya, S.L. Mironov and Yu.V. Sokolov, Institutes of Biochemistry imeni A.V. Palladin and of Physiology imeni A.A. Bogomolets, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] Studies were conducted on the electrical characteristics of channels induced by alpha-latrotoxin (isolated from the venom of Latrodectus mactans tredecimguttatus) in bilayer lipid membranes formed from phosphatidylcholine and cholesterol (2:1). Studies on the separation of ion solutions demonstrated that the channels possessed features analogous to those of calcium channels in biological membranes. The selectivity of the alpha-latrotoxin channels was predicated on binding of the ions within the channels, with the permeability decreasing in the following series for alkaline earth elements: $Mg^{2+} > Ca^{2+} > Sr^{2+} \approx Ba^{2+}$. The blocking efficiency of transitional metals for these channels ranked as follows: $Mn^{2+} < Zn^{2+} \leq Ni^{2+} \leq Co^{2+} < Cd^{2+} << La^{3+}$. The channels were also found to be permeable to monovalent cations, depending on the concentration of bivalent ions on the cis-, but not the trans-, side of the membrane. Figures 6; references 21: 5 Russian, 16 Western.

12172/9835
CSO: 1840/498

UDC 577.152.3

AMINOACID SEQUENCES OF PEPTIDES IN N-TERMINAL DOMAIN OF δ-ENDOTOXIN BACILLUS THURINGIENSIS SUBSPECIES ALESTI. HYPERVARIABLE REGIONS OF B. THURINGIENSIS ENDOTOXINS

Moscow BIOKHIMIYA in Russian Vol 51, No 6, Jun 86
(manuscript received 13 Nov 85) pp 1048-1050

[Article by G.G. Chestukhina, S.A. Tyurin, A.L. Osterman, O.P. Khodova and V.M. Stepanov, All-Union Scientific Research Institute of Genetics and Selection of Industrial Microorganisms, Moscow]

[Abstract] B. Thuringiensis form crystalline δ-endotoxins during sporulation (20 subspecies produce molecularly-identical--but differing in effect--endotoxins). Comparative analysis of primary structure of its terminal domain showed that changes in aminoacid compositions were not found throughout the entire polypeptide chain but were concentrated in a few hypervariable regions in the 347-625 sequence. Such hypervariable regions may recombine independently in various δ-endotoxin molecules explaining wide variations of their biological activity and specificity of action. This is just another case of effective adaptation of identical structures to different functions. References 2: Western.

7813/9835
CSO: 1840/506

UDC 577.15:576.8.097

SOME PROPERTIES OF UREASE ENCAPSULATED IN LIPOSOMES

Kiev UKRAINSKIY BIOKHIMICHESKIY ZHURNAL in Russian Vol 58, No 4, Jul-Aug 86
(manuscript received 20 Jan 86) pp 31-35

[Article by V.I. Zakrevskiy, N.G. Plekhanova and V.A. Khramov, Scientific Research Antiplague Institute, Volgograd]

[Abstract] Effect of plant urease incapsulated in liposomes--on the substrate hydrolysis kinetics--was investigated. The enzyme was selected by the ability of its urea substrate to penetrate through intact lecithine membrane, making it possible to study catalytic activity in intact liposomes. Urease was obtained from soy bean flour by salt water extraction; the liposomes contained 3-5% of native enzyme preparation. Urease activity can be suppressed by heavy metal ions but, after incapsulation in liposomes, these inhibitors cannot penetrate the lecithine membrane. It was shown that urease immobilized in liposomes is found in native state in the internal vesicle volume: it can hydrolyze substrates penetrating the lipid membrane. Membrane penetration is then the sole factor regulating the rate of enzymic reaction because it determines transport of

urea inside the liposomes. The lipid membrane protects the enzyme from inhibitors and proteolytic enzymes. The K_m for incapsulated enzyme was found to be $1 \cdot 10^{-3}$M and for a free urease $4 \cdot 10^{-4}$M. Figures 3; references 9: 2 Russian, 7 Western.

7813/9835
CSO: 1840/501

UDC 547,963.4:543.424:577.332

TYROSINE RADICAL CATALYSIS OF LIGHT INDUCED DEPROTONATION OF RETINAL ALDIMINE IN BACTERIORHODOPSIN

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 4, Apr 86
(manuscript received 27 Nov 85) pp 325-338

[Article by Yu.A. Ovchinnikov, N.G. Abdulayev, A.V. Kiselev, I.R. Nabiyev, Kh.V. Vasileva and R.G. Yefremov, Institute of Bioorganic Chemistry imeni M.M. Shemyakin, USSR Academy of Sciences, Moscow]

[Abstract] Rhodopsin is responsible for light energy conversion to chemical energy in halophilic bacteria. The role of tyrosine residues in bacteriorhodopsin (BR) molecule was investigated by biosynthetic and chemical modifications, combined diffraction spectroscopy and circular dichroism. Tyrosine radicals were isolated which participate in the primary processes of proton transfer through a membrane. It was shown that one of the tyrosine radicals: 79, 83 or 185, catalyzed light-induced deprotonation of retinal aldimine in BR within 10 μs after absorption of light quanta and participated in formation of a chromophoric center of the pigment. To determine which specific radical participates in BR functions, the method offdirected mutagenesis should be used which makes it possible to alter selectively the codons and consequently the aminoacid residues in the expressed protein. This active residue is connected by a hydrogen bond to aspartic or glutamic acid carboxyl group. An earlier model of microenvironment of retinal aldimine and the scheme of BR functioning in early stages of photoconversions was in agreement with spectral properties of kinetically calculable intermediate product of the photocycle; the observed tyrosine deprotonation effects and protonation of the carboxyl group during formation of L_{550} and M_{412} are also covered by this model. Figures 7; references 28; 7 Russian, 28 Western (3 by Russian authors).

7813/9835
CSO: 1840/478

UDC 547.269.1:577.352.27

NOVEL MERCARBIDE ELECTRON-DENSE TAGS FOR HYDROCARBON MOIETY OF LIPID BILAYER

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 4, Apr 86
(manuscript received 22 Feb 85, after final revision 28 Nov 85) pp 423-427

[Article by S.A.Marakushev, L.A. Levchenko, G.I. Likhtenshteyn, A.P. Kaplun*, V.M. Mekler, A.V. Rayevskiy and V.I. Shvets*, Chernogolovka Division of the Institute of Chemical Physics, USSR Academy of Sciences; *Moscow Institute of Fine Chemical Technology imeni M.V. Lomonosov]

[Abstract] Mercarbide electron-dense tags (MEDT) are compounds containing groups of mercury atoms used in electron microscopic studies of biological macromolecules which normally do not produce the required contrast because of the light elements in their structure (C, H, N, O). In present work a method was reported for incorporation of MEDT into hydrophobic fragments of the membranes using 11-mercaptoundecanoic acid (MUA) as the vehicle. Amperometric titration showed that MUA is incorporated effectively into liposomes and the number of functional SH groups corresponds to the quantity of MUA found in the liposomes. Addition of MEDT at a 1:2 ratio to MUA blocked the SH groups completely. Quenching of pyrene fluorescence indicated the location of the marker in the hydrocarbon portion of lipid bilayer resulting from its interaction with MUA. This method makes it possible to mark hydrophobic fragments of the membranes and expands the potential for studying complex biological systems using EM and X-ray structural analysis. Figures 2; references 18: 9 Russian (2 by Western authors), 9 Western (1 by Russian authors).

7813/9835
CSO: 1840/478

LIPOLYTIC ENZYMES

Riga NAUKA I TEKHNIKA in Russian No 1, Jan 87 pp 12-13

[Article by R.Yu. Are, Laboratory of Chemical Technology and Analysis, Institute of Microbiology imeni A. Kirkhenshteyn, LaSSR Academy of Sciences]

[Abstract] Lipolytic enzymes (lipases) are widely used in medicine because of their ability to regulate biological membrane functions. Regulation of lipolytic activity may assist in prophylaxis of cardio-vascular diseases, because of the ability of lipases to break down fats. It is also a factor in olfactory aspects of fruits and dairy products. Some lipases are used in production of detergents for treatment of fatty effluents. In nature lipases are found in animal organisms, in plants and in microorganisms. Coworkers at the Institute of Microbiology imeni A. Kirkhenshteyn concentrated their efforts on yeasts as the source for lipases; optimal synthetic conditions were

established, methods of purification and optimal conditions for their activity (temperature, pH, effects of inhibitors, activators and stabilizers). Depending on the final applications of lipase, various degrees of purity are required. Current production level is several kilos per year by the efforts of this research laboratory. As its use expands, order amounting to thousands of tons are expected. New production methods are obviously needed.

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CSO: 1840/496

UDC 577.152.1

SELECTIVITY FACTORS OF CYTOCHROME P-450-CATALYZED OXIDATION OF ALKANES

Moscow BIOKHIMIYA in Russian Vol 51, No 9, Sep 86 (manuscript received 9 Oct 85) pp 1454-1458

[Article by Ye.I. Karasevich and A.M. Khenkin, Chernogolovka, Moscow Oblast, Department, Institute of Chemical Physics, USSR Academy of Sciences]

[Abstract] Studies were conducted on the hydroxylation of n-hexane by microsomal fractions isolated from control rabbits (M_c), as well as from rabbits treated per os with either phenobarbital (M_{ph}) or with 3-methylcholanthrene (M_{mc}) to assess the effects of cytochrome P-450 induction. The data showed that cytochrome P-450 from noninduced and induced microsomes displayed different regioselectivities. Analysis of the hexanol-2/hexanol-3 and hexanol-1/hexanol-3 ratios among the products and determination of the effects of such factors as the oxidation system employed (NADPH-O_2 or PhIO) demonstrated that in the M_{mc} system the active site had dimensions of ca. 6 x 8 Å, whereas in the M_c and M_{ph} preparations the active sites had dimensions of ca. 5 x 6 Å. These observations demonstrated that the different molecular forms of cytochrome P-450 differed in their efficiency in oxidizing the C-H bonds on the first, second, or third carbon atom. References 20: 6 Russian, 14 Western.

12172/9835
CSO: 1840/509

UDC 577.151.45:577.152.199.2

REACTION OF C_{14}- AND C_{16}-UNSATURATED ALIPHATIC ALDEHYDES WITH BACTERIAL LUCIFERASES

Moscow BIOKHIMIYA in Russian Vol 51, No 9, Sep 86
(manuscript received 14 Oct 85) pp 1459-1464

[Article by G.N. Sakharov, A.D. Ismailov, B.G. Kovalev, V.S. Danilov and N.S. Yegorov, Moscow State University imeni M.V. Lomonosov; All-Union Scientific Research Institute of Biological Plant Protection, Kishinev]

[Abstract] Kinetic and thermodynamic parameters were determined for the reaction of various stereoisomers of unsaturated aliphatic aldehydes with luciferases isolated from Beneckea harveyi and Photobacterium fischeri. The luciferases differed in their affinity for the various aldehydes, with substrate specificity predicated on such features as chain length, the number and position of double bonds, and their isomeric status. A number of unsaturated C_{16} react more efficiently with the enzymes than tetradecanal. Amond the C_{16} stereoisomers, maximum substrate activity was exhibited by (Z)-6-hexadecenal (B. harveyi luciferase), and (Z)-6-hexadecenal and (Z)-9-hexadecenal in the case of P. fischeri luciferase. The reaction with C_{16} aldehydes exceeded 4- to 10-fold the rate with hexadecanal. In addition, the C_{16}-aldehydes (Z,Z)-6,11, (Z)-9, (E)-9 and (Z)-6 were more specific substrates than tetradecanal, the most saturated compound. The sensitivity threshold with the B. harveyi luciferase with monoene and diene aldehydes with a double bond at $\geq$6 approached 10 pg, and 10 pg in the case of the P. fischeri enzyme. Figures 3; references 20: 5 Russian, 15 Western.

12172/9835
CSO: 1840/509

UDC 577.1

AMINO ACID COMPOSITION OF ENDOGENOUS PHYSIOLOGICALLY-ACTIVE OLIGOPEPTIDES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 292, No 5, Feb 87
(manuscript received 29 Jul 86) pp 1261-1264

[Article by A.A. Zamyatnin, Institute of Normal Physiology imeni P.K. Anokhin, USSR Academy of Medical Sciences, Moscow]

[Abstract] A statistical analysis was conducted on 152 physiologically active peptides isolated from various species. On the basis of the sequence data, 23 peptide families were identified. The information led to the conclusion that the mechanisms involved in the reaction of the various peptides with their receptors may have universal application, relying, as these mechanism do, on electrostatic and hydrophobic interactions. These common features

evidently underlie the polyfunctional nature of the endogenous oligopeptides. The features common to a given class of bioregulators may also be utilized in the search for novel, physiologically-active peptides. References 15: 8 Russian, 7 Western.

12172/9835
CSO: 1840/554

UDC 576:574.963.3

CRYSTALLIZATION OF 30S RIBOSOMAL SUBPARTICLE OF THERMUS THERMOPHILUS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 292, No 5, Feb 87 (manuscript received 25 Nov 86) pp 1271-1274

[Article by M.M. Yusupov, S.D. Trakhanov, V.V. Baryin, V.L. Borovyagin, M.B. Garber, S.E. Sedelnikova, O.M. Selivanova, S.V. Tishchenko, V.A. Shirokov and I.M. Yedintsov, Protein Institute (Pushchino, Moscow Oblast), Institute of Crystallography imeni A.V. Shubnikov (Moscow), and Institute of Biological Physics (Pushchino, Moscow Oblast), USSR Academy of Sciences]

[Abstract] Microdialysis cells were employed for the crystallization of the 30S subparticle of Thermus thermophilus ribosomes, by varying the salt concentration, and the concentration of 2-methyl-2,4-pentadiol from 16 to 20% v/v. For electron microscopy the crystalline structures were fixed with glutaraldehyde, and in some cases stained with uranyl acetate. Analysis of thin sections at magnification of 120,000X revealed highly ordered internal packing. The crystals were in the form of an orthogonal lattice, with the dimension of a single cell on the order of 360 x 360 x 110 Å. Figures 3; references 7: 2 Russian, 5 Western.

12172/9835
CSO: 1840/554

UDC 577.152.3

ALKALOID-INACTIVATING ENZYMES OF BLOOD PLASMA

Moscow BIOKHIMIYA in Russian Vol 51, No 4, Apr 86
(manuscript received 23 Jul 85) pp 649-654

[Article by N.R. Yelayev, L.D. Yevdokimov and A.V. Ryzhakov, Chair of Biological and Organic Chemistry, Petrozavodsk State University imeni O.V. Kuusinen]

[Abstract] Continuing studies were conducted on rat plasma to further define hemoprotein enzymes responsible for inactivation of alkaloids. Utilization of conventional isolation and purification techniques resulted in the isolation of two hemoenzymes capable of oxidizing tertiary amines using molecular oxygen. One hemoprotein enzyme ($HPaa_1$) was found on polyacrylamide gel electrophoresis to consist of three subunits with MWs of 63, 35 and 12 kdaltons. Another hemoprotein ($HPaa_2$) was a single monomer with a MW of 73 kdaltons. The S-shaped inactivation curves for atropine indicated that both enzymes possess cooperative characteristics, with an identical Hill coefficient of 2.3. Preliminary studies have shown that a similar enzyme or enzymes are present in human plasma. Figures 5; references 6: 5 Russian, 1 Western.

12172/9835
CSO: 1840/504

UDC 577.152.1

EFFECTS OF EDTA ON BACTERIAL LUCIFERASE

Moscow BIOKHIMIYA in Russian Vol 51, No 4, Apr 86
(manuscript received 16 Jul 85) pp 622-626

[Article by Yu.A. Malkov and V.S. Danilov, Biology Faculty, Moscow State University imeni M.V. Lomonosov]

[Abstract] The use of EDTA in luciferase isolation has led to a study designed to test its effect on Photobacterium fischeri luciferase. Incubation of the enzyme with 3.3×10^{-3} M EDTA resulted in a 24-28% reduction of activity, with full recovery of activity (94-100%) on removal of the chelating agent. EDTA also improved the stability of P. fischeri luciferase: incubation with 1.54×10^{-3} M EDTA in 0.01 M phosphate buffer, pH 7.0, resulted in retention of full activity for 7 days. In the absence of EDTA ca. 60% of the activity was lost in that time span. Concentration of EDTA that had no effect on activity per se (3×10^{-4} M) diminished the sensitivity of the bioluminescent system on reaction with aliphatic aldehydes, which may be due to prevention of the autooxidation of $FMNH_2$. The effects of EDTA on luciferase were attributed to chelation of nonheme iron. Figures 4; references 12: 5 Russian, 7 Western.

12172/9835
CSO: 1840/504

UDC 577.344:577.354.24

13-CIS→TRANS-PHOTOISOMERIZATION OF BACTERIORHODOPSIN CHROMOPHORE BY HIGH-INTENSITY LIGHT

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 10, Oct 86 (manuscript received 25 Apr 86) pp 984-992

[Article by S.P. Balashov and E.S. Imasheva, Biological Faculty, Moscow State University imeni M.V. Lomonosov]

[Abstract] Low-temperature absorption spectroscopy was employed in an analysis of 13-cis trans-isomerization of bacteriorhodopsin chromophore, using purple membranes isolated from Halobacterium halobium. At -180°C and illumination with >520 nm light of high-intensity (5 x 10^2 W/m^2), a new intermediate--P582--was detected. P582 was formed in quantum yield of 3 x 10^{-4}, a figure ca. 3 orders of magnitude smaller than the yield of the bathoform K^C obtained with low-intensity (1-2 W/m^2) illumination. Up to 85% of 13-cis-bacteriorhodopsin is transformed into P582, with the latter relaxing at -60°C to trans-bacteriorhodopsin. The absorption band of P582 is similar to that of trans-bacteriorhodopsin, but shows a 4 nm bathochromic shift. Analysis of the absorption spectra also revealed an intermediate form (P580) between P582 and trans-bacteriorhodopsin. As a result, the following series of transformations was proposed: 13-cis-bacteriorhodopsin→ P582 $\xleftarrow{-180°C}$ P580 $\xrightarrow{-60°C}$ trans-bacteriorhodopsin. At 0°C phototransformation of P582 included intermediates analogous to K, L and M forms of the trans-bacteriorhodopsin photocycle. The existence of P582 was interpreted to indicate that the protein environment of the chromophore possesses different conformations in 13-cis- and trans-bacteriorhodopsin. Figures 6; references 23: 7 Russian, 16 Western.

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ELECTROGENIC STAGES IN ELECTRON-TRANSPORT CHAIN OF CHROMATOPHORES ISOLATED FROM RHODOPSEUDOMONAS SPHAEROIDES

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 10, Oct 86 (manuscript received 27 Mar 86) pp 1011-1019

[Article by A.Yu. Semenov, M.D. Mamedov, A.P. Mineyev, S.K. Chamorovskiy and N.P. Grishanova, Moscow State University imeni M.V. Lomonosov]

[Abstract] Studies were conducted with Rhodopseudomonas sphaeroides chromatophores associated with a collodion phospholipid membrane to assess the electrogenic events induced by ruby and neodynium laser flashes. The electrical measurements demonstrated that the photoelectric response in a reducing environment consisted of two successive reactions: $P\text{-}870/P\text{-}870^+ \overset{e^-}{\rightarrow} Q_a/Q_a^-$ and $c_2^{2+}/c_2^{3+} \overset{e^-}{\rightarrow} P\text{-}870^+/P\text{-}870$. On the basis of proposed for a hypothetical proton channel. In addition to the two presented previously, with respective lifetimes of less than 100 nsec and ca. 250 μsec, a third reaction in response to even flashes was identified as $Q_a^-/Q_a \xrightarrow{e^-+2H^+} Q_b^-/Q_bH_2$, with a lifetime of ca. 100 μsec. Figures 6; references 33: 14 Russian, 19 Western.

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UDC 577.352(26+465)

KINETICS OF STAPHYLOTOXIN-INDUCED INCREASE IN CONDUCTIVITY OF LIPID BILAYERS

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 10, Oct 86 (manuscript received 18 Oct 85; in final form 29 Apr 85 [sic]) pp 1049-1056

[Article by O.V. Krasilnikov, R.Z. Sabirov, V.I. Ternovskiy and B.A. Tashmukhamedov, Institute of Physiology, Uzbek SSR Academy of Sciences, Tashkent]

[Abstract] A study was conducted to elucidate the mechanisms of channel formation by Staphylococcus aureus alpha-toxin in bilayer lipid membranes formed from cholesterol or the total brain-lipids of rabbits. Kinetic studies on the increase in conductivity revealed similar kinetics in the case of both membranes in the form of S-shaped curves. The data were interpreted to indicate that alpha-toxin-induced channels involved initial aggregation of the toxin (T) into complexes (T_n), and subsequent transition of the complexes into a conductive state (T_n^*). The sequence of events

occurring in the membranes could be expressed by the following formulation: $nT = T_n - T_n^*$, where n = the degree of aggregation of the toxin. The second stage appears to be the limiting factor, since the kinetic plots may be linearized in first order reaction kinetics. The rate of increase in conductivity (V) may then be expressed as being proportional to the concentration of the toxin aggregates: $V = k_1[T_n]$, where k_1 is the rate constant. Maximum conductivity was obtained at pH 5.6. Conductivity was also dependent on the membrane potential, with the channels closing at a membrane potential of 80 millivolts. Tables 1; references 8: 4 Russian, 4 Western.

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EFFECTS OF IONIC COMPOSITION OF SOLVENT ON DYNAMICS OF CHANNEL-FORMATION BY STAPHYLOTOXIN IN BILAYER LIPID MEMBRANES

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 10, Oct 86 (manuscript received 9 Jan 86) pp 1057-1061

[Article by O.V. Krasilnikov, R.Z. Sabirov and B.A. Tashmukhamedov, Institute of Physiology, Uzbek SSR Academy of Sciences, Tashkent]

[Abstract] A study was conducted on the effects of solvent ions on channel-formation by staphylotoxin in oxidized cholesterol of bilayer lipid membranes [BLM]. At pH 5.6, optimal for channel-formation by the toxin, single-charged anions activate conduction by the channels. The effectiveness of the anions were analogous to their permeability through the channels. Since the anions did not affect the concentration of the toxin in the membrane, the effects were attributed to changes in the energy of activation for the transition of the toxin-channels into the conductive (open) state. Alkali earth metal ions (Me^{2+}) were observed to inhibit opening of the channels. The mechanism of action of Me^{2+} involved an increase in the energy of activation for transition into the conductive mode. Figures 6; references 6 (Russian).

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EFFECTS OF O-PHENANTHROLINE ON ELECTROGENESIS IN PRIMARY CHARGE SEPARATION IN RHODOPSEUDOMONAS SPHAEROIDES ACTIVE SITES

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 5, May 86
(manuscript received 20 Dec 85) pp 513-518

[Article by M.D. Mamedov, N.I. Zakharova, A.A. Kondrashin* and A.Yu. Semenov, Moscow State University imeni M.V. Lomonosov; *People's Friendship University imeni Patrice Lumumba, Moscow]

[Abstract] Direct electrometric studies were conducted on the active sites of Rhodopseudomonas sphaeroides in the membranes of proteoliposomes encapsulating ascorbate and ferrocyanide. Conditions were defined under which only that portion of the active site that was internalized showed activity, and led to the demonstration that o-phenanthroline inhibited electron transfer between primary (Q_a) and secondary (Q_b) quinone electron acceptors. In addition, o-phenanthroline was also found to inhibit light-dependent reduction of Q_a following exposure to OGM laser (694 nm, 20 mJ). The degree of inhibition was dependent on both the concentration of o-phenanthroline and ubiquinone-10. These observations and concentration dependence indicated that the inhibition of the primary dipole $P807^+ \cdot Q_a$ was competitive in nature. Figures 4; references 18: 7 Russian, 11 Western.

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UDC 577.344:577.354.24

BATHOCHROMIC FORMS OF 13-CIS- AND TRANS-BACTERIORHODOPSIN AT 90 K

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 7, Jul 86
(manuscript received 16 Jan 86) pp 730-734

[Article by S.P. Balashov and F.F. Litvin, Moscow State University imeni M.V. Lomonosov]

[Abstract] A spectroscopic study was conducted on the different forms of photoproducts obtained by subjecting a dark-adapted purple membranes of Halobacterium halobium to 520 nm light at 90 K. The mixture containing 50% trans- and 50% 13-cis-bacteriorhodopsin yielded four bathochromic forms (634, 623, 615 and 605 nm) on exposure to the low intensity (2 W/m^2) light. The results were explained on the basis that each of the molecules of bacteriorhodopsin gave rise to two forms. The trans- isomer yielded the 634 and 623 nm forms, and the 13-cis- isomer formed the 615 and 605 nm forms. The decrease in the concentration of the 615 and 605 nm forms on light adaptation of the membranes by an order of magnitude confirmed their

formation from 13-cis-bacteriorhodopsin. Figures 1; references 18: 5 Russian, 13 Western.

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UDC 541.144.7

ELECTROGENIC REDUCTION OF SECONDARY QUINONE ACCEPTOR IN RHODOSPIRILLUM RUBRUM CHROMATOPHORES

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 6, Jun 86 (manuscript received 20 Dec 85) pp 557-562

[Article by O.P. Kaminskaya, L.A. Drachev, A.A. Konstantinova, A.Yu. Semenov and V.P. Skulachev, Interfaculty Special Problems Scientific Research Laboratory of Molecular Biology and Bioorganic Chemistry imeni A.N. Belozerskiy, Moscow State University imeni M.V. Lomonosov]

[Abstract] A model system was devised to test for electrogenic reduction of the secondary quinone electron acceptor, consisting of R. rubrum chromatophores associated with phospholipid-impregnated collodion film. Using the addition of ubiquinone-10 made possible the reconstruction of electron transfer between the primary and secondary quinone acceptors ($Q_A \rightarrow Q_B$). Evaluation of the rapid kinetics of light-dependent generation of membrane potential demonstrated that, in dark-adapted chromatophores, electron transfer from $Q_A^{\cdot-}$ to Q_B after the first light flash (ruby (694 nm, 20 mJ) and neodynium (530 nm, 100 mJ) lasers) was not electrogenic. Reduction of $Q_B^{\cdot-}$ to Q_BH_2 after a second light flash was accompanied by an electrogenic phase (τ = 250 μsec at pH 7.5) with an amplitude equivalent to ca. 10% of the total photopotential amplitude. The latter phase was attributed to vector protonation of Q_B^{2-}. Figures 5; references 25: 8 Russian, 17 Western.

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EFFECTS OF CHLOROPHYLL ON STRUCTURE OF MODEL GALACTOLIPID AND PHOSPHATIDYLGLYCEROL MEMBRANES. PART 2. FREEZE-ETCHING ELECTRON MICROSCOPY

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 6, Jun 86
(manuscript received 5 Oct 85) pp 592-600

[Article by V.L. Borovyagin, I.A. Vasilenko*, G.M. Sorokoumova* and Yu.S. Tarakhovskiy, Institute of Biological Physics, USSR Academy of Sciences, Pushchino, Moscow Oblast; *Moscow Institute of Fine Chemical Technology imeni M.V. Lomonosov]

[Abstract] Freeze-etching electron microscopy was conducted to analyze the effects of chlorophyll a and b on the structural features of bilayer lipid membranes formed by mixtures of monogalactosyldiglyceride:phosphatidylglycerol (2:1 and 3:1), monogalactosyldiglyceride:digalactosyldiglyceride:phosphatidylglycerol (2:2:1 and 3:2:1), and from total lipid fraction of spinach chloroplasts. The lipid:chlorophyll ratio in all cases was 5:1. The effects of chlorophyll on the structural organization of the membranes was profound, and generally characterized by the formation of intramembranous lipid particles and a hexagonal phase (H_{II}). The transformation processes included the formation of areas of linear contact between the monolayers, point fusion, pure formation, stalking and stalk breaks, and inverted micelles. In addition, specific restructuring was also seen depending on the lipid components in the bilayers. The chlorophyll molecules primarily affected the configuration and/or redistribution of charged hydrophilic regions of the lipids, changing thereby the degree of hydration of the lipid molecules and their interaction with one another. Figures 6; references 34: 4 Russian, 30 Western.

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EFFECTS OF ANTIBODIES ON ELECTRICAL CONDUCTIVITY OF ION CHANNELS FORMED BY AMPHOTERICIN B IN BIMOLECULAR LIPID MEMBRANES (BLM)

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 6, Jun 86
(manuscript received 29 Dec 85) pp 609-620

[Article by O.V. Kolomytkin, Institute of Biological Physics, USSR Academy of Sciences, Pushchino, Moscow Oblast]

[Abstract] Antibodies were raised in New Zealand rabbits against asymmetrical ion channels formed from amphotericin B (AB) and cholesterol in BLM, and used to assess channel function. The antibodies bound specifically and irreversibly with the trans- side of the channel, increasing by several orders

of magnitude the probability of finding the channels in the open state. The conductivity of open channels was not affected by the antibodies, neither did the antibodies have an effect on the conductivity of asymmetrical channels when added to the BLM from the cis-side. Furthermore, the antibodies were also innocuous in the case of symmetrical channels formed by the addition of AB to both sides of the BLM. Comparative studies with channels, formed by AB analogs and cholesterol, underlined the specificity of the AB antibodies and the potential of this method in studies on ion channels. Figures 8; references 20: 6 Russian, 14 Western.

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UDC 541.144.7

EFFECT OF ELECTRON DONORS AND ACCEPTORS ON KINETICS OF PHOTOELECTRIC RESPONSE DECAY IN RHODOSPIRILIUM RUBRUM AND RHODOPSEUDOMONAS SPHEROIDES CHROMATOPHORES

Moscow BIOLOGICHESKIYE MEMBRANE in Russian Vol 3, No 3, Mar 86
(manuscript received 4 Jul 85) pp 213-228

[Article by L.A. Drachev, O.P. Kaminskaya, A.A. Konstantinov, M.D. Mamedov, V.D. Samuilov, A.Yu. Semenov, V.P. Skulachev, V.K. Gins* and Ye.N. Mukhin, Moscow State University imeni M.V. Lomonosov; *Institute of Soil Management and Photosynthesis, USSR Academy of Sciences, Pushchino, Moscow Oblast]

[Abstract] In preceding studies, the kinetics of the generation of transmembrane electric potential difference was investigated using a laser pulse method with special attention given to the increase in this difference. Analysis of the kinetics of photopotential decay could explain transfer of electrons into the redox chains of chromatophores incorporated in colloidal film. Relaxation of these potentials generated by laser pulses in the dark was investigated on chromatophore membranes adsorbed on colloidal film impregnated with a solution of phospholipids in decane. In absence of any additives, a rapid decay of photoelectric potential was observed (about 70 ns) corresponding to charge recombination of the primary dipole in the reaction center. Addition of ascorbate and penetrating redox mediators (N,N,N',N'-tetramethyl-p-phenylenediamine, 2,3,5,6-tetramethyl-p-phenylenediamine and phenazinemethylsulfate) which reduce rapidly photooxidated $P780^+$ dipole component prevented rapid decay of the photopotential resulting in slower dissipation of the transmembrane electric potential difference characteristic of a passive discharge. Addition of quinones to the phospholopid solution had a similar effect; o-phenanthrolene counteracted this effect. Incorporation of chromatophores in colloidal film evidently leads to extraction of ubiquinone from secondary acceptor site in the reactive center complex which may be reversed by addition of ubiquinone-10. These experiments failed to support the hypothesis on electrogenic transfer of electrons from primary receptor to secondary quinone, the actual oxidizer of Q_A^-. Figures 9; references 32: 7 Russian, 25 Western (7 by Russian authors).

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NATURE AND APPROXIMATE MATHEMATICAL DESCRIPTION OF LATROTOXIN CHANNEL PROPERTIES

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 9, Sep 86
(manuscript received 7 Feb 85) pp 936-943

[Article by O.V. Krasilnikov, R.Z. Sabirov, V.I. Ternovskiy and B.A. Tashmukhamedov, UzSSR Academy of Sciences, Tashkent]

[Abstract] In a lipid bilyaer, latrotoxin forms ionic channels with a wide spectrum of amplitudes which may be explained either by lipid or protein channel concepts. To decide this point, effect of the lipid nature on conductivity of latrotoxin channel (LC) was studied. In general, LC conductivity increased with increased value of the negative surface potential of the membrane. Changing surface potential should lead to an altered ratio between cations and anions next to the membrane. It was shown that selectivity of LC does not depend on the nature of bilayer lipid; evidently, the inlet to the channel is surrounded by ionogenic groups of the protein molecule. A decrease in pH value lowered cationic selectivity and integral conductivity of latrotoxin-modified bilayer lipid membranes. It was shown that properties of such channels could be described by electrostatic interactions of ions passing through the channel with the potential created by ionogenic groups situated at the entrance to the channel. Figures 7; references 32: 19 Russian, 13 Western (1 by Russian authors).

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MECHANISM OF PORE FORMATION DURING ELECTRIC PENETRATION OF MEMBRANES

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 9, Sep 86
(manuscript received 27 May 86) pp 944-951

[Article by S.L. Leykin, R.V. Glazer* and L.L. Chernomordik, Institute of Electrochemistry imeni A.N. Frumkin, USSR Academy of Sciences, Moscow; *Humboldt University, East Berlin]

[Abstract] A strong electric field leads to reversible damage of the barrier function in cell membranes. Theoretical and experimental aspects of the generation of hydrophilic groups during electric penetration are presented. Hydrophobic pores appeared as a result of thermal oscillations of the bilayer lipid molecules. When critical dimensions are reached by such a pore, a reorientation of polarheads of lipid molecules takes place forming a sandwich and transformation of the pore from hydrophobic to hydrophilic. This moment corresponds to the top of the energy barrier for pore formation.

Accumulation of metastable hydrophilic pores leads to enhancement of membrane conductivity--reversible electrical penetration. These theoretical concepts are substantiated by experimental data on electrical penetration of bilayer lipid membrane modified by UO_2^{++} ions. Figures 7; references 15: 4 Russian, 11 Western (4 by Russian authors).

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UDC 577.23

EFFECT OF GUANIDINE CHLORIDE ON STRUCTURE AND FUNCTIONAL PROPERTIES OF PHOTOSYNTHETIC REACTION CENTERS IN ISOLATED PREPARATIONS AND IN CHROMATOPHORE MEMBRANES OF NONSULFUROUS PURPLE BACTERIA

Moscow BIOKHIMIYA in Russian Vol 51, No 6, Jun 86
(manuscript received 6 Sep 85) pp 992-1002

[Article by Zh.B. Lukshene, V.P. Shinkarev, N.I. Zakharova, V.V. Shubin and A.A. Kononenko, Chair of Biophysics, Biology Faculty, Moscow State University imeni M.V. Lomonosov; Institute of Biochemistry imeni A.N. Bakh, USSR Academy of Sciences, Moscow]

[Abstract] The secondary structure of photosynthetic reactive centers (RC) of Rhodopseudomonas spheroides was determined by the circular dichroism method. The observed changes in secondary structure were compared to changes of electron transfer characteristics in RC. Guanidine chloride (GC) was used as the agent changing the structure and electron transport; this denaturing agent breaks hydrogen bonds and disturbs hydrophobic relations in proteins. At different concentrations of GC, two populations of RC may be isolated: one in which the kinetics of electron transfer remain practically unchanged (probably native conformation of RC protein) and another, in which the kinetics of P870 reduction in darkness is altered, the stabilization of semiquinone Q_B, formed during a light pulse in presence of N,N,N',N'-tetramethyl-p-phenylenediamine (TMPD) disappears, and the electron transfer rate from TMPD to P870 is decreased. The denaturing effect appears stronger in RC preparations than in chromatophores; this is due to greater "nativity" of RC proteins and stabilizing role of lipids. Figures 9; references 54: 21 Russian (4 by Western authors); 33 Western (2 by Russian authors).

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UDC 577.352.5.37:612.8.014.423

WATER PORES IN SODIUM CHANNEL PROTEIN GLOBULES RELATED TO GATING MECHANISM

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 292, No 4, Feb 87 (manuscript received 25 Jun 86) pp 989-992

[Article by I.V. Chizhmakov and Z.A. Sorokina, Institute of Physiology imeni A.A. Bogomolets, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] An analysis was conducted on the effects of osmotic pressure on sodium channels, using membranes derived from isolated neurons of the spinal ganglia in rats. Electrophysiological studies demonstrated that adjusting the osmotic pressure with various agents (e.g., sucrose, xylitol, glycerol, ethylene glycol, ethanol, methantol) resulted in a reduction in influx sodium currents by values approaching 65-70%. The reduction in the amplitudes was correlated with the molecular radii of the organic molecules, and made possible estimation of the pore size of the water channels. In the final analysis, the gating mechanism of the sodium channels was attributed to a water pore with a radius of 0.22 to 0.28 nm. Molecules with radii greater than 0.28 nm elicit similar effects, regardless of molecular size. Changes in the molecular radii of molecules that affect membrane potentials lie within a range of 0.06 nm. This fact indicated that the structure that allows an osmotic water flow is rigid, but that the molecular size may be altered by contact with the pore wall in transit, suggesting that the estimated pore size may be too small. Figures 4; references 9: 7 Russian, 2 Western.

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MECHANISM OF OSMOTIC LYSIS OF ERYTHROCYTES

Kiev KRIOBIOLOGIYA in Russian No 2, Apr-Jun 86 (manuscript received 12 Feb 85) pp 23-25

[Article by Ye.A. Gordiyenko and O.I. Gordiyenko, Institute of Problems of Cryobiology and Cryomedicine, Ukrainian SSR Academy of Sciences, Kharkov]

[Abstract] Experimental data of Rand are compared with a theoretical model to produce a new equation for the mean time of fluctuation formation of a pore in an erythrocyte membrane. The satisfactory agreement between experimental and calculated data indicates that the mechanism of osmotic lysis of lipid vesicles or cells is related to fluctuation formation of a macroscopic pore in the membrane, subject to isotropic tension upon contact with a hypotonic medium. Figures 2; references 6: 4 Russian, 2 Western.

6508/9835
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BIOGEN INTERBRANCH SCIENTIFIC AND TECHNOLOGICAL COMPLEX

Moscow DOMESTIC SERVICE in Russian 4 Feb 87 1715 GMT

[Summary] Biogen is an inter-branch scientific and technological complex, which is intended for the all-round intensification of biotechnology. Commentator Andrey Zelentsov speaks of its importance.

[Zelentsov, voice:) It is only over the past 15-20 years that theoretical biology, that is to say, genetics, has offered society technology that has begun to yield dividends. At the present time most Soviet biotechnology is carried out by the USSR Ministry of the Medical and Microbiological Industry, which is headed by Valeriy Alekseyevich Bykov. On the subject of the areas in which the latest scientific achievements are to be used, the Minister said:

(Bykov, voice:) "They will all be used in the field of medicine to obtain various kinds of medicinal preparations, in the field of agriculture for the creation of a stable fodder base, an enhancement of soil fertility and an improvement in horticulture and so forth, and finally in the field of ecology. This is not just the creation of waste-free biotechnological production units during the period of application of biotechnology to the national economy into which we are now entering, but also at the same time the resolving of the problems of utilizing industrial waste or the results of man's industrial activity."

(Zelentsov, resuming:) In 1964, staff personnel at the All-Union Genetics and Selection of Industrial Micro-organisms Research Institute began work there on the breeding of microorganisms capable of synthesizing lysine, an essential amino acid. Lysine is used to enrich feeds for cattle and poultry. As a result of the institute's work and purposeful work by industry our country at present produces about 20,000 tons [annually] of this amino acid which is used as a feed additive. These 20,000 tons have an equivalent economic effect to 1,000,000 tons of fodder grain. The production of lysine will have been almost doubled by the end of the Five-Year Plan period. Consequently this will each year save 2,000,000 tons of fodder grain.

Furthermore, biotechnology has made it possible to obtain fundamentally new medicinal preparations consisting of proteins produced by the human body

itself. I have in mind interferon, which is now undergoing clinical trials for the treatment of a whole number of viral illnesses. I also have in mind fundamentally new vaccines that are able to stimulate the body into developing immunity and to do so without any side effects.

Plant breeding also offers a field of rich potential for the employment of biotechnological techniques. Doctor of Biological Sciences Konstantin Georgiyevich Skryabin says that, over the past three or four years, molecular geneticists and molecular biologists have learned how to introduce genes into a plant cell. Moreover we can now obtain a plant, every cell of which has inherited the new gene. The outlook here is very extensive. We shall obviously be able to obtain plants that are resistant to herbicides. Indeed the first two examples of such plants do already exist. The plant is able to obtain herbicide and, parallel to this, the genetic engineer is able to obtain herbicide and, parallel to this, the genetic engineer is able to obtain a plant culture resistant to the herbicide. Collective and state farms can be sold a pair of things--chemical weedkillers and also that strain of grain or bean that will be resistant to the weedkiller.

Biotechnology makrs a revolution in production. It is for this reason that a whole section of the Comprehensive Program for Scientific and Technological Progress of CEMA member countries to the year 2000 is devoted to biotechnology. This is why the Biogen inter-branch scientific-technical complex has been created. It includes industrial enterprises and a number of scientific institutes. Its nucleus will certainly be the Shemyakhin Bioorganic Chemistry Institute of the USSR Academy of Sciences.

During the current Five-Year Plan period about 250 kinds of fundamentally new products are to be fully developed on the basis of diverse biotechnology.

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CSO: 1840/471-E

DYUMAYEV INTERVIEWED ON CEMA BIOTECHNOLOGY COOPERATION

Sofia NARODNA MLADEZH in Bulgarian 20 Jan 87 p 3

[Yevgeniy Petrov interview with Kirill Dyumayev, chairman of the CEMA Permanent Commission on Cooperation in biotechnologies, given in Moscow, date of interview not given--first paragraph is NARODNA MLADEZH introduction]

[Excerpts] A comprehensive program on scientific-technical progress of the CEMA member-countries was adopted at the 41st (Extraordinary) CEMA Session held in Moscow. One of the five priority trends included in that program was biotechnology. Our special correspondent in Moscow met and interviewed Prof. Dr. Kirill Mikhailovich Dyumayev, deputy chairman of the USSR State Committee for Science and Technology, and chairman of the CEMA Permanent Commission on Cooperation in Biotechnologies, on the specific tasks of this priority trend, one year after the adoption of the comprehensive program, and on the future prospects of this sector in science and production.

[Petrov] A year has elapsed since the adoption of the comprehensive program. How can you describe this program, what are its results?

[Dyjmayev] If we are talking about practical application, we can say that we used the reserves available in the member-countries, even prior to the adoption of the program. For the first stage of work we envisage 110 developments, with Bulgaria participating in some of them, for example, concerning the application of prostaglandins in agriculture. This development is aimed at the fertilization of the greatest number of cattle under the most favorable conditions. The mass implementation of the developments included in the program, however, will take place in 1987, and later. The year that has elpased, 1986, was a period of organizational work, a period of setting up the necessary connections and specifying the tasks. We are now working on the establishment of joint collectives, that will be followed by joint enterprises. [passage omitted]

[Petrov] The basic trends in the development of biotechnologies had actually been pointed out in the comprehensive program, but as Arnold Romanov, your colleague, eloquently pointed out in an interview with the daily IZVESTIYA, these trends are similar to an iceberg, of which only a

small part is visible. Is it possible to take a look at the part concealed beneath the "surface"?

[Dyumayev] All CEMA member-countries are participating in the implementation of the basic trends for the period up to 2000. The solution of these problems presupposes the production of approximately 400 varieties of biotechnological goods. However, only 260 such varieties are envisaged for the period up to 1990. The majority of developments are related to agriculture. We envisage, for example, a 1.6 to 1.8-fold increase in the average production of fodder protein for the animal husbandry sector of each member-country. Considerable attention is to be devoted to the development of new, highly productive wheat varieties that should be particularly resistant to plant diseases.

In the medical sector, our efforts are aimed at developing processes and at organizing the production of protein-based substances likely to play an important role in the human body, such as interferon, insulin, and hormones inducing growth in human beings and animals. These substances are very expensive today but they are urgently necessary for the treatment of serious diseases. [passage omitted]

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BIOTECHNOLOGY: COOPERATION PRIORITY IN CEMA

Moscow INTERNATIONAL AFFAIRS in English No 1, Jan 87 pp 131-132

[Article by Leonid Bauman]

[Text] With growth in population and material production there is a greater demand for foodstuffs, power, fuel, raw materials and fodder. Hence the need for fundamentally new sources, technological processes and materials to meet this demand. Therefore, the Comprehensive Program of Scientific and Technical Progress of the CEMA Member States to the Year 2000 has listed biotechnology as one of its priorities.

In the section of the document relevant to this area, emphasis is put on joint R&D with an eye to boosting gene and cellular engineering, microbiological synthesis and enzyme engineering in public health, agriculture, the food and other industries, and environmental profection.

Biotechnology makes use of biological processes in production. At the dawn of the century, this applied only to age-old human activities like bread-baking, cheese- and wine-making, fodder-siloing, etc. Today, biotechnology deals with changing the properties of the living cell through synthesis and the introduction of genes into the cell (gene engineering); the changing of properties of living matter (cellular engineering); construction of proteins and their subsequent synthesis (protein engineering); as well as microbiological synthesis with industrial use of enzymes, and effective biological catalysts (engineering enzymology).

CEMA countries have been making use of biotechnological processes to produce interferon, insulin, growth hormones, hundreds of various antibiotics, vitamins and enzymes, as well as numerous varieties of proteins and peptides which are powerful biological stimulants for the human body. Production of seedlings and selection species of the varieties of potatoes, sugar-beets, lucerne and other crops has been put on industrial basis.

In the food industry, biotechnological processes are, for instance, used to produce pulp and sugar from starch. Biotechnology is becoming increasingly indispensable in the construction of purification facilities. It is forecasted that in the near future 10 to 12 percent of all organic raw materials and over 100 finished items will be produced by biotechnological methods.

By straining every effort, each CEMA country can on its own, of course, cope with some of the problems involved. But that approach would hardly help intensify the development of biotechnology or make it more efficient. Hence the objective need for CEMA countries' cooperation in the field of biotechnology because this will help pool their efforts and resources in the priority areas of scientific and technical progress.

Socialist economic integration, and the old and extensive cooperation of CEMA countries in science and technology have created most favorable conditions for that. That is why special measures in biotechnology, mapped out by the Comprehensive Program for Scientific and Technical Progress, will continue and develop this cooperation on a new, higher level.

The CEMA Standing Commission on Cooperation in Public Health has been implmenting its agreement on Medical Immunological Preparations since 1980. Under the agreement, scientists from the socialist community countries work collectively on new methods of obtaining monoclone antibodies and enzyme preparations for research in gene engineering. Modern immunochemical methods are being applied to work out the diagnostic system for major infections and non-infectious diseases, and preparations for their treatment.

Under the aegis of the CEMA Standing Commission on cooperation in the food industry, scientists and practical workers work in tandem to produce new foods and artificial food additives. CCEMA countries with developed dairy industries have been applying their original methods of extracting valuable substances from whey. Some time ago, cheese was in short supply caused by both increased demand and the shortage of calf rennet. Recently, Soviet scientists have developed adequate substitutes for the latter. The economic return from using new microbic enzymes instead of natural rennet is 15 rubles per one ton of raw material, while one ton of preparation saves approximately 60,000 rubles.

Scientists increasingly concentrate on the possibility of using proteinss of unicellular organisms, natural accumulators of protein. Bulgarian researchers have developed a method of obtaining proteins and biologically active substances with the use of a certain yeast culture, which raises protein content in produce up to 70 percent of dry weight. In Czechoslovakia, numerous yeast cultures are being used to process whey into animal fo der with high protein content (46 to 57 percent).

The microbiological section of the CEMA Standing Commission on Cooperation in the Chemical Industry sets a good example of international specialization and cooperation in producing chemical and biological additives to fodder. In 1979, Cuba, Czechoslovakia, the GDR, Poland and the USSR signed a General Agreement on cooperation in building a plant in the Soviet Union which would produce 300,000 tons of fodder yeast from refined oil paraffins.

At present, CEMA countries are uniting efforts in making better use of achievements in microbiological synthesis, gene and cellular engineering and engineering enzymology. They work to secure the earliest economic application of major breakthroughs made in these disciplines and to build new industries of their own based on biotechnology.

In agriculture, biotechnology will substantially help to meet the demand for foodstuffs on the basis of scientifically established norms of consumption. Here, priorities include the creation and development of:

new, highly productive and weather-resistant varieties, and hybrids of agricultural crops obtained by gene and cellular engineering;

microbiological protective means, plant growth stimulants, and bacteriological fertilizer;

valuable fodder additives and biologically active substances (fodder proteins, amino acids, enzymes, vitamins, veterinary preparations, etc) to raise cattle productivity;

new bioengineering methods for effective prevention, diagnosis and treatment of basic animal diseases.

The objective in industry is to develop methods of bacterial geotechnology to be used in mining (better use of ore deposits, increased oil extraction), microbiological production of organic substances (alcohol, solvents, enzymes, organic acids, etc), and also methods of producing valuable foodstuffs and additives.

In environmental protection, joint efforts are focused on obtaining biological methods of utilizing industrial, urban and agricultural waste, and producing high-quality fertilizer from sewage and exhaust gases.

Medicine and public health stand to gain most from the development of biotechnology as new biologically-active substances, highly effective preparations and diagnostic means will be created. This will promote the early diagnosis, prevention and treatment of tumorous, cardiovascular, hereditary, infectious (including virus), and other grave illnesses.

All this implies, of course, better training and retraining of personnel and improved exchange of information. Much importance is attached to standardization and specializing in producing biotechnological equipment.

Apart from the economic benefits it gives, biotechnology is also important in social terms because it is directly involved in providing more and more foodstuffs, medicines and other necessities for the population. The aim of CEMA countries' cooperation in biotechnology is to make even further improvements in people's lives.

/9835
CSO: 1840_553-E

UDC 577.152.199+577.151(03+04)

PREPARATION AND PROPERTIES OF PROSTAGLANDIN H-SYNTHASE IMMOBILIZED IN INSOLUBLE POLYELECTROLYTE COMPLEXES

Moscow BIOKHIMIYA in Russian Vol 51, No 8, Aug 86
(manuscript received 13 Aug 85) pp 1268-1275

[Article by D.B. Kirpotin, Yu.A. Motorin, A.T. Mevkh, S.D. Varfolomeyev, A.F. Orlovskiy and K.L. Gladilin, Institute of Biochemistry imeni A.N. Bakh, USSR Academy of Sciences; Moscow State University imeni M.V. Lomonosov]

[Abstract] Evaluation was conducted on immobilized preparations of prostaglandin H-synthase (PgHS) (EC 1.14.99.1), isolated from ram vesicular glands. The enzyme was immobilized in polycation-polycation mixtures to yield 1 μm spherical particles by simple mixing in tris-HCl buffer, pH 8.1. Depending on the polyelectrolytes employed, the efficiency of immobilization ranged from a low of 77% for a protamine-chondroitin sulfate preparation, to a high of 100% for polyethylimine, and polyethylimine-poly(C) mixtures. Retention of enzymatic activity by the immobilized PgHS ranged from 25% for protamine-chondroitin sulfate preparations, to 72% for the polyethylimine-poly(C) carrier. A certain degree of irreversible loss of enzymatic activity occurred on immobilization, with the pH maximum of the immobilized PgHS at ca. 8.5, while the native enzyme showed a much broader optimum plateau over 8-9. Immobilization increased thermal tolerance, with an optimum temperature range of 67-68°C, vs. a temperature optimum of 55-56°C for native PgHS. Time inactivation plots for the native and the immobilized forms differed, with the former possessing an inflection point. The lack of an inflection point with the immobilized PgHS indicated that the polyelectrolyte favored a single structural form of the enzyme. Figures 6; references 23: 13 Russian, 10 Western.

12172/9835
CSO: 1840/508

UDC 577.15.062:576.851.48

KINETIC MECHANISMS OF MULTISUBSTRATE REVERSIBLE REACTIONS IN HETEROGENOUS BIOCATALYTIC SYSTEMS

Moscow BIOKHIMIYA in Russian Vol 51, No 3, Mar 86 (manuscript received 27 May 85) pp 395-403

[Article by N.N. Zuyeva, K.I. Voyvodov, A.N. Verevkin, V.I. Yakovleva and I.V. Berezin, Chemistry Faculty, Moscow State University imeni M.V. Lomonosov]

[Abstract] Kinetic studies were conducted on multisubstrate reversible reactions catalyzed by free and immobilized bacterial cells, resulting in the demonstration that the rates of forward and reverse reactions are dependent on activated diffusion across the cytoplasmic membrane. Consequently, the activity of such microbial biocatalytic systems are dependent on the conditions under which such systems are employed. Analyses of the substrate and product diffusion rates have been applied to systems employing cell suspension and cells immobilized in polyacrylamide gel or carrageenan for a kinetic analysis of L-aspartic acid production by E. coli 85, L-malic acid by E. coli 85 and K12B78, and 3,4-dihydroxyphenyl-L-alanine by Citrobacter freundii 62. These findings confirmed the previous report that the kinetics of multisubstrate systems in cell-dependent catalysis depend on diffusion constants across the cytoplasmic membrane and the experimental conditions [Zuyev, NN, et al., Biokhimiya, 45(2):2206-2215, 1980]. Figures 2; references 15: 13 Russian, 2 Western.

12172/9835
CSO: 1840/503

UDC 577.15.087.8

BIOELECTROCHEMICAL SYSTEMS IN STEROID SYNTHESIS

Moscow BIOKHIMYA in Russian Vol 51, No 9, Sep 86 (manuscript received 20 Sep 85) pp 1442-1445

[Article by A.I. Yaropolov, A.L. Gindilis, Ye.A. Borman and K.A. Koshcheyenko, Institutes of Biochemistry imeni A.N. Bakh (Moscow) and Biochemistry and Physiology of Microorganisms, (Pushchino, Moscow Oblast), USSR Academy of Sciences]

[Abstract] Studies were conducted on bioelectrical transformation of hydrocortisone to prednisolone, utilizing Arthrobacter globiformis cells as a source of 3-ketosteroid-Δ'-dehydrogenase activity and phenazine methosulfate (PM) as the electron carrier. In the case of a cell suspension system and a platinum electrode operating a 1-1.8 V, 100% transformation of hydrocortisone to prednisolone was obtained. In a system in which the A. globiformis cells were immobilized in a conductive support matrix

[Varfolomeev, S.D. et al., J. Molec. Catalysis, 9: 223-226, 1980] biotransformation was 92% effective with PM in the bathing solution, and 81% conversion efficiency was obtained when PM was also immobilized in the matrix. The speed and convenience of the method, as well as the high yields, suggest that this approach deserves further development for biological conversions. Figures 2; tables 1; references 8: 5 Russian, 3 Western.

12172/9835
CSO: 1840/509

UDC 57.086.833:57.083.34:575.16

TRANSFORMATION OF RODENT BONE MARROW CELLS BY RECOMBINANT PLASMID pBRSV

Leningrad TSITOLOGIYA in Russian Vol 28, No 12, Dec 86
(manuscript received 7 Jan 86) pp 1345-1350

[Article by T.B. Kazakova, V.A. Shatov, I.A. Verbina, N.V. Tsymbalenko and V.D. Kravtsov, Institute of Experimental Medicine, USSR Academy of Medical Sciences, Leningrad; First Leningrad Medical Institute]

[Abstract] Cloning of eukaryotic genes in animal and human cells is performed to study regulatory mechanisms of gene expression and to provide materials for gene therapy. One promising object for correction of hereditary defects is hemopoiesis precursor cells having the capability of proliferation in the body. Attempts to correct hereditary defects by transformation of bone marrow cells with a normal gene require further development of methods of transformation, increasing its frequency, selecting the optimal eukaryotic vector, as well as studies of the mechanisms of transduction of a gene, its selection and stabilization in the genome of a recipient cell. There are many methods for transfer of genetic material into somatic cells, including calcium phosphate coprecipitation of DNA. The task of the present work was transformation of bone marrow cells in laboratory rodents by means of the plasmid pBRSV, analysis of the effectiveness of transformation, the stability and functional activity of recombinant DNA under nonselective conditions. The presence of recombinant DNA in the mouse bone marrow cells was proven by hybridization of DNA of clones obtained from the transformed bone marrow cells under nonselective conditions with labeled pBRSV DNA. A portion of the pBRSV DNA was not included in the genome of the mast cells. Restriction analysis of extrachromosomal DNA taken from the spleen showed that after long-term presence in the mouse, the plasmid DNA retains its sites of recognition of the endonuclease EcoRl. Formation of two fragments during restriction indicates preservation of the nucleotide sequences of pBR325 DNA and Sv40 DNA. The absence of selective pressure facilitates development of deletion changes in the structure of the recombinant DNA. It is still possible to fix transformation of bone marrow cells by the recombinant plasmid carrying the SV40 genome by biochemical and genetic analysis. Figures 3; references 20: 4 Russian, 16 Western.

6508/9835
CSO: 1840/547

INCREASED SAFETY MEASURES AND MONITORING AT IGNALINA NUCLEAR PLANT

Moscow MEDITSINSKAYA GAZETA in Russian 13 Feb 87 p 1

[Article by V. Korchagina and V. Khrustov, correspondents (Snechkus, Vilnius, and Moscow)]

[Abstract] This lengthy article reports on measures for higher operational safety and protection of the environment at the Ignalina Nuclear Power Station (IgAES) and in its vicinity, and on expansion of medical facilities in this area. The first generating unit of the station, which is located on the shore of Lake Drukshyay, went into operation in late 1983.

G. Negrivoda, chief engineer of IgAES, related that the station is the world's largest with an RBMK reactor. Since the accident at the Chernobyl Nuclear Power Station, the power of the Ignalina station's generating unit has been lowered from 1.5 to 1.4 million kilowatts. Negrivoda explained that this was a safety measure that was adopted at all stations with RBMK reactors. Representatives of institutions of the Lithuanian Academy of Sciences, including the institutes of physics and physical-technical problems of power engineering, are conducting environmental studies at an academy research facility which was created at Lake Drukshyay before construction of the station began. Their information reportedly indicates that the radiation background in the vicinity of IgAES has not changed since the station went into operation.

Vladislav Anatolyevich Zubarev, head of the station's laboratory of external radiation monitoring, told about methods and equipment which the laboratory uses to monitor about 350 parameters of the air, water, soil, vegetation, and radiation fields in an observation zone around IgAES with a radius of 30 kilometers. The condition of the air and of precipitation is being analyzed with the aid of sampling units and thermoluminescent dosimeters, for example. "Iskra-226" microprocessors are used to control the instrumentation and to process the data.

An appendix to the article records comments of N.F. Lukonin, USSR minister of atomic power engineering, regarding measures which have been taken since the Chernobyl accident to ensure stable operation of the power unit of the Ignalina station. They include doubling the number of monitoring devices along the radius and for vertical power distribution. An accident-prevention

system for vertical distribution of the neutron flow has been introduced. Lukonin says that long-term measures have been outlined which are aimed at preventing accidents in the event of gross errors such as those which were committed at Chernobyl. Special training programs for operators will begin this year at centers which were created recently at the Novovoronezh and Smolensk nuclear power stations. These centers will train personnel who work with VVER-1000 and RBMK-1000 reactors, respectively.

FTD/SNAP
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CSO: 1840/473-E

NEW PROPERTY OF INTERFERON DISCOVERED

Moscow TASS in English 6 Feb 87

[Text] Unfavorable hereditary effects of environmental pollution on man that result in the birth of babies with malformations can be prevented by the use of interferon. A TASS correspondent was told this in the Institute of General Genetics of the USSR Academy of Sciences. The new property of interferon was discovered there. Interferon is a compound that initially evolved from human blood. Now it has been synthesized by methods of biotechnology. The range of its effects practically does not differ from that of natural interferon which is used for combatting infectious diseases.

/9835
CSO: 1840/470-E

UDC 581.162:575.222.72

ANALYSIS OF MEIOSIS AND MICROSPOROGENESIS IN F_1-HYBRIDS OF BARLEY CROSSED WITH WHEAT

Leningrad TSITOLOGIYA in Russian Vol 28, No 7, Jul 86
(manuscript received 17 Jun 85) pp 683-686

[Article by I.N. Orlova, All Union Institute of Plant Cultivation, Leningrad]

[Abstract] Extensive work is under way attempting to produce hybrids between wheat and barley hoping to enrich both of these phylogenetically removed families with special properties. Analysis of meiosis and microsporogenesis is performed to determine degree of the homology of genomes of crossed types and to elucidate the mechanism of diploidy. In this study this was done for Hordeum vulgare L. barley and two types of wheat: Triticum aestivum L. and T. timopheevii Zhuk. The hybrids exhibited effects of typical haploid meiosis with low intensity of chromosome conjugation. Bivalent associations were observed only very rarely. It was noted that the hybrids were both male and female sterile. Tetraploid meiocytes were observed in sporagenic complexes of the pollen. It was concluded that tetraploid meiocytes may serve effectively in production of amphodiploid hybrids of barley and wheat. References 11: 5 Russian, 6 Western.

7813/9835
CSO: 1840/545

UDC 572.5

PROTOONCOGENS IN HUMAN TERATOCARCINOMAS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 292, No 4, Feb 87
(manuscript received 28 Mar 86) pp 986-988

[Article by N.N. Mazurenko, R. Emanoil-Ravier and F.L. Kiselev, All-Union Oncological Scientific Center, USSR Academy of Medical Sciences, Moscow; St. Louis Hospital, Paris, France]

[Abstract] A comparative analysis was conducted on the expression of the oncogenes c-myc, c-abl, c-Ki-ras, and c-fos in teratocarcinoma cells Tera I, Tera II and PA I and human amnion cells AV_3. The analysis was based on theproduction of RNA specific to the oncogenes. Taking the AV_3 cells as representing 100% expression, the degree of expression of the oncogenes was directly related to the proliferative activity of the teratocarcinoma cells and their differentiation. Thus, expression of the c-myc oncogene was at the highest level in Tera I cells--as represented by a figure of 50%--and decreased to 47% in Tera II cells, and to 30% in PA I cells. Similar findings were obtained for the remaining oncogenes, but the respective levels of expression were less pronounced: e.g., for c-Ki-ras the levels for Tera I, Tera II and PA I cells were, respectively, 27, 5 and 1%. These observations confirmed previous observations that oncogenes are well expressed in immature, poorly-differentiated cells, as in the AV_3 cells. With differentiation, as evidenced with the malignant cells, expression is inhibited in proportion to the extent of differentiation. This fact suggests that oncogenes also function in maintaining growth and multiplication of cells. References 15: 1 Russian, 14 Western.

12172/9835
CSO: 1840/476

UDC 575.16:575.224.46:57.086835

GENETIC TRANSFORMATION OF SOMATIC CELLS. PART 10. MORPHOLOGIC TRANSFORMATION AND ALTERATION OF GROWTH CHARACTERISTICS OF NIH 3T3 CELLS UPON ADMINISTRATION OF v-myc ONCOGEN

Leningrad TSITOLOGIYA in Russian Vol 28, No 12, Dec 86
(manuscript received 8 Jan 86) pp 1329-1335

[Article by T.V. Pospelova, M.Z. Kapitskaya, G.A. Dvoryanchikov and N.V. Tomilin, Institute of Cytology, USSR Academy of Sciences, Leningrad]

[Abstract] Elevated expression of the cell oncogene c-myc has been detected in many tumor cells. However, administration of plasmids containing the cloned c-myc oncogen has not led to morphologic transformation of NIH 3T3

cells, which requires simultaneous administration of a second (ras) oncogene or additional treatment with a tumor promoter. The viral oncogene v-myc also induces morphologic transformation of primary rat fibroblast cultures only with additional exposure to the tumor promoter. An attempt was made to induce stable, inherited changes in growth characteristics of NIH 3T3 cells (morphologic transformation "foci") by administration of v-myc. The question was also investigated as to whether maintenance of a state of morphologic transformation requires constnat presence of the oncogene or, in other words, whether the selection of morphologic transformants is stabilized by the oncogene sequences in the genome. The sequences of plasmids of pv-myc were found to be retained in transformants, their quantity not differing significantly in earlier and later passages. During cultivation of v-myc transformants, selective pressure thus must arise in favor of preservation and, probably, expression of this oncogene. Expression of the v-myc oncogene apparently leads to reduction in regulatory barriers for cell proliferation and acceleration of cell fission. The pv-myc plasmid used in this article contains no special promoter for expression of the v-myc gene which, however, does not eliminate the possibility of expression of the oncogene in the transformants. Figures 2; references 25: 4 Russian, 21 Western.

6508/9835
CSO: 1840/547

UDC 57.083.3

MONOCLONAL ANTIBODY HAE3 AGAINST HUMAN GLYCOPHORIN A ANTIGENIC DETERMINANTS

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 8, Aug 86
(manuscript received 10 Mar 86) pp 798-803

[Article by Ye.B. Mechetner, A.G. Tonevitskiy, Ye.S. Iyevleva, E.N. Rozinova and V.L. Zorin, All-Union Cardiological Scientific Center and the All-Union Oncological Scientific Center, USSR Academy of Medical Sciences, Moscow]

[Abstract] Further studies were conducted with the monoclonal IgM antibody (HAE3) against human glycophorin A to define its scope of reactivity and potential usefulness. HAE3 was without cytotoxic effects, with immunofluorescence and agglutination studies demonstrating that HAE3 bound to the membranes of erythrocytes and reticulocytes and nucleated erythroid cells. Immunoblotting studies demonstrated that HAE3 reacted with erythrocyte shadow proteins with MW of 40 and 80 kdaltons, as well as with purified glycophorin A. In addition to the potential use of HAE3 in immunopurification of glyocphorin A and isolation of pure human lines of erythroid cells, HAE3 may also have potential diagnostic applications in human leukemia. Figures 3; references 19: 3 Russian, 16 Western.

12172/9835
CSO: 1840/482

UDC 577.175.1

COMPARATIVE CHARACTERISTICS OF HUMAN INTERLEUKIN-2 ISOLATED FROM BLOOD LYMPHOCYTES AND T-LYMPHOMA CELLS

Moscow BIOKHIMIYA in Russian Vol 51, No 8, Aug 86
(manuscript received 17 Oct 85) pp 1341-1347

[Article by M.S. Iobadze, V.V. Kulikov, T.A. Kupriyanova, S.N. Bykovskaya and V.I. Bakhutashvili, All-Union Oncological Scientific Center, USSR Academy of Medical Sciences, Moscow; Institute of Morphology, Georgian SSR Academy of Sciences, Tbilisi]

[Abstract] Data are presented on the isolation of human interleukin-2 (IL-2) from normal peripheral blood lymphocytes and JURKAT FHRC T-lymphoma cells, using standard techniques of gel filtration, and ion-exchange chromatography on DEAE and CM-Sephadex. The lymphoma cells were found to yield 10- to 12-fold more IL-2 on a U/ml basis, with the lymphoma cells providing a more homogenous IL-2 preparation. In both cases, the MW of the IL-2 preparations fell in the 12-20 kdalton range. Studies with T cell proliferation demonstrated requirements for successive need for phytohemagglutinin and IL-2, as well as human serum. In addtion, a B-5 line of T-lymphocytes was derived with an absolute requirement for IL-2 and periodic antigenic stimulation in the form of allogenic lymphocytes. In the absence of IL-2, the B-5 cells die off within 36 h. Although the JURKAT FHRC cells appear a convenient source of IL-2, the danger of contamination with mycoplasma or oncogenic viruses would preclude clinical applications. Figures 3; references 15 (Western).

12172/9835
CSO: 1840/508

UDC 577.122

ABILITY OF VIRUS SV40 T-ANTIGEN TO MIMIC ACTION OF SPECIFIC GROWTH FACTOR OF T-LYMPHOCYTES--INTERLEUKIN-2

Moscow BIOKHIMIYA in Russian Vol 51, No 6, Jun 86
(manuscript received 16 Jul 85) pp 931-936

[Article by V.V. Kulikov, M.A. Shlyankevich, O.B. Drize and V.S. Shapot, Scientific Research Institute of Carcinogenesis, All Union Scientific Oncology Center, USSR Academy of Medical Sciences, Moscow]

[Abstract] The goal of this work was to evaluate the ability of T-antigen to replace the action of T-lymphocyte proliferation factor. To achieve this, highly purified T-antigen of SV40 virus was inserted into human T-lymphocytes using vesicles from erythrocyte ghost replacing consecutively one of three factors controlling cell proliferation. It was shown that T-antigen

could not substitute for the antigenic stimulus required for blast transformation of small T-lymphocytes; it could stimulate the effect of interleukin-2, however the cells required various nonspecific growth promoting factors and transferrin. The ability of T-antigen to stimulate growth factor may explain the wide polymorphism of tumors caused by papova viruses. Ability of T-antigen to induce cell proliferation bypassing normal intracellular controls may be the first step in carcinogenesis; the following damage to cell chromosomal apparatus also caused by T-antigen may lead to activation of cell protooncogenes. Figures 4; references 15: 4 Russian, 11 Western.

7813/9835
CSO: 1840/506

UDC 577.123

EFFECTS OF TUMOR GROWTH IN MICE ON LYMPHOCYTE DNA AND NUCLEOTIDE SYNTHESIS, SUSCEPTIBILITY TO GLUCOCORTICOIDS, DIFFERENTIATION AND IMMUNE FUNCTION

Moscow BIOKHIMIYA in Russian Vol 51, No 4, Apr 86
(manuscript received 17 Aug 85) pp 635-643

[Article by S.N. Khramtsova, G.I. Potapova, L.V. Dmitriyeva and V.S. Shapot, All-Union Oncological Scientific Center, USSR Academy of Medical Sciences, Moscow]

[Abstract] Female C3HA were used to study the effects of tumorigenesis on the function of splenic T and B lymphocytes, in a system employing a transplanted hepatoma-22 and a hepatoma induced by o-aminoazotoluene. With the first clinical manifestations of malignancy, studies on the T and B cells revealed a 2- to 6-fold decrease in the activity of adenosine deaminase, and a 7- to 10-fold reduction in the activity of purine-nucleoside phosphorylase, correlated with weakened immune function. These enzymatic and immune changes were accompanied by changes in the concentrations of various deoxynucleotides, and inhibition of DNA synthesis. The latter was particularly profound in the T cells. Between days 8 and death of the animals with hepatoma-22, a sharp increase in DNA synthesis was observed, despite continuing depression of immune function and adenosine deaminase activity. With growth of both types of malignancies, the activity of the CTP-dependent thymidine kinase activity in the T cells increased, coinciding on a temporal basis with activation of antigen-specific splenic T-suppressors. Figures 3; references 25: 13 Russian, 12 Western.

12172/9835
CSO: 1840/504

UDC 612.112.94.0171:591

EFFECTS OF GANGLIOSIDES ON CYTOTOXIC ACTIVITY OF SYRIAN HAMSTER NATURAL KILLER CELLS AND SUSCEPTIBILITY OF TARGET CELLS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 292, No 5, Feb 87 (manuscript received 26 Jun 86) pp 1278-1280

[Article by V.A. Matveyeva, S.P. Amineva, T.Ye. Klyuchareva, E.V. Dyatlovitskaya and L.D. Bergelson, corresponding member, USSR Academy of Sciences, Scientific Research Institute of Cancerogenesis of the All-Union Oncological Scientific Center, USSR Academy of Medical Sciences; Institute of Bioorganic Chemistry imeni M.M. Shemyakin, USSR Academy of Sciences, Moscow]

[Abstract] Studies were conducted with the gangliosides NeuAcLacCer (I), $(NeuAc)_2LacCer$ (II) and $NeuAcCgOse_4Cer$ (III) to assess their effects on the cytotoxic activity of natural killer (NK) cells derived from Syrian hamster blood against human thymoma MOLT-4 cells. A variety of incubation and preincubation experiments demonstrated that III had virtually no effect on the NK cells, while I and II inhibited cytotoxicity. Similarly, I and II increased the susceptibility of the MOLT-4 cells to the cytotoxic effects of the NK cells, while I was without a telling effect. The data indicate that I and II become incorporated into the cytoplasmic membrane of the MOLT-4 cells, thereby increasing their susceptibility to the NK cells by reacting with receptors on the effector cells. References 9: 7 Russian, 2 Western.

12172/9835
CSO: 1840/554

UDC 57.085.3:591.424

PRODUCTION AND DESCRIPTION OF NEW STRAIN OF DIPLOID CELLS FROM EMBRYONAL HUMAN LUNG TISSUE

Leningrad TSITOLOGIYA in Russian Vol 28, No 12, Dec 86 (manuscript received 21 Aug 85) pp 1373-1376

[Article by L.G. Stepanova, S.B. Slekseyev, A.A. Zgurskiy, G.A. Lomanova and N.V. Shalunova, Moscow Scientific Research Institute of Viral Preparations, USSR Academy of Medical Sciences]

[Abstract] Primary cell cultures have a number of significant shortcomings including frequent viral contamination, heterogeneity and oncogenic transformation. There are but a few strains of human diploid cells which have been sufficiently-completely described, such as WI-38, MRC-5 and IMR-90. To support various scientific and practical operations, the authors have produced a domestic strain of human diploid cells based on lung tissue from 8 to 17-week embryos. The method of Hayflick and

Moorhead was used. The properties of the lines of diploid cells obtained satisfy the requirements of the International Committee for Cell Cultures and WHO. However, a sufficiently large cell bank has been established only for one of the lines developed (L-68), which is suggested as a substrate for the development of viral vaccines, for diagnostic purposes and for scientific research. Figures 5; references 19: 9 Russian, 10 Western.

6508/9835
CSO: 1840/547

LASER FOR TREATMENT OF SEPTIC WOUNDS

Tallinn SOVETSKAYA ESTONIYA in Russian 7 Jan 87 p 1

[Article by A. Podvezko]

[Excerpt] A new apparatus has been installed and is operating successfully in a new polyclinic in the Lasnamyae district of Tallinn. The laser principle--transmission of luminous energy over a distance and transformation of this energy into heat energy--is being used to treat wounds here. This is the first experience in our republic with use of a laser in septic surgery.

There is not a single shiny object in the operating room where the laser is used. Everything has a dull finish, including the apparatus itself, lamps, and instruments. This is a requirement for operation of the laser, which can even be dangerous if precautions are not taken.

Laser beams from four sources pass through a single focus and form a wide cone. A surgeon directs it at an open wound. Bacteria vaporize instantly, and blood vessels up to 1.5 millimeters in diameter coagulate. The physician can thus deal with a wound that is practically dry and clean.

"Anything I used to know about the use of lasers in surgery came solely from science-fiction novels," joked Petr Yugay, a surgeon of the polyclinic. "Seriously, I saw a report on the 'Vremya' television program that a laser was being used in a clinic in Ashkhabad. As a medical practitioner, I became directly interested in this. I telephoned Ashkhabad, then Moscow, to find out the details. I made arrangements with Academician V.I. Chazov for special training, which took a month at the All-Union Center for Laser Surgery. Ordinarily, new apparatus appears first and physicians receive the necessary special training for it later. With us, it was the other way around...

"After that came trips to the manufacturer-plant in Ul'yanovsk, and negotiations. And then I finally got to work with the new apparatus."

It took two years to introduce the new treatment method in Estonia. This is not very long, by present standards.

FTD/SNAP
/9835
CSO: 1840/473-E

MODERN METHODS OF TREATMENT OF ACUTE HEPATIC INSUFFICIENCY

Tbilisi SOOBSHCHENIYA AKADEMII NAUK GRUZINSKOY SSR in Russian Vol 124, No 3, Dec 86 pp 632-636

[Summary of article by A.M. Gagua and L.L. Gugushvili]

[Text] Heterotopic transplantation is technically most desirable, but it is performed with limited success. Orthotopic liver transplantation is believed to be the most promising method.

Hence, the authors suggest that treatment of acute hepatic insufficiency should begin with decompression of the portal system and with measures for detoxication of the portal blood.

The authors have developed a method of orthotopic transplantation involving the use of extra- and intracorporeal shunts which permits the transfer of the graft from donor to recipient without disturbance of circulation in the organ until its complete inclusion in the recipient's circulatory system. As a result, the functional viability of the transplant is preserved and the technical side of the operation is simplified (Authors' certificate of invention No 706070).

/9835
CSO: 1840/603-E

ULTRASONIC EYE MASSAGE

Moscow IZOBRETATEL I RATSIONALIZATOR in Russian No 2, Feb 87 pp 14-15

[Article by A. Solodskiy, North Caucasus Scientific Center]

[Abstract] History of the development of automatic management of an acoustic mode of ultrasound welding (USSR patent #961 902) and self-correcting system for this operation (USSR patent #1 008 699) is reported. In 1977 this technique was applied to treatment of glaucoma: without surgical intervention vessels supplying the optical nerve could be expanded reducing intraocular pressure and reviving the functions of eyeball membranes. The procedure is short, simple and could even be performed by nurses. The problem is that there are not enough of these units available to treat all the patients. These instruments have thus far been produced by scientists and not by industry. Presently, production of a limited number of such instruments is planned by the Rostov-on-Don ultrasound generator production plant.

7813/9835
CSO: 1840/525

BACTERIA IN THE FEED TROUGH

Moscow TASS in Russian 12 Feb 87 0947 GMT

[Text] Soviet scientists have proposed use of new proteinaceous organisms, which double their biomass 500 times quicker than the most productive agricultural crops, as a new type of feed for livestock and poultry. A series of experiments on the accelerated cultivation of such a biomass have been successfully conducted on the livestock farms and poultry batteries on the outskirts of Leningrad. The results of the experiments have been announced at the Congress of the All-Union Society of Protozoologists which is taking place here.

Yevgeniy Vinogradov, a professor from the Leningrad Institute of Pasteur, told us that the new feed product has been created on the basis of one of the types of the so-called mucilaginous bacteria, which is widespread in nature. The biomass contains 17 amino acids, a large amount of polysaccharides and protein, and 18 mineral elements. Besides, these bacteria actively break down cellular tissue, and when added to coarse feed, they transform it into a product easily digestible for animals.

The experimenters said, that they have managed to select nutritious media from industrial wastes on which the bacteria grow with an astonishing speed.

/9835
CSO: 1840/468-E

UDC 576.8.098

COMPARATIVE ANALYSIS OF PROTEIN COMPONENTS OF ENTOMOCIDAL CRYSTALS OF BACILLUS THURINGIENSIS SBSP. ISRAELENSIS

Moscow BIOKHIMIYA in Russian Vol 51, No 3, Mar 86
(manuscript received 26 Jun 85) pp 449-457

[Article by I.A. Zalunin, L.I. Kostina, G.G. Chestukhina, M.Ye. Bormatova, F.S. Klepikova, O.M. Khodova and V.M. Stepanov, All-Union Scientific Research Institute of the Genetics and Breeding of Industrial Microorganisms, Moscow]

[Abstract] A comparative study was conducted on the endotoxin of Bacillus thuringiensis israelensis (bti), which differs from the entomocidal δ-endotoxins of other subspecies in that bti toxin appears as two proteins rather than one. Initial extraction of bti yields proteins with MW of 28,000 and 130,000 daltons. On solubilization in 0.05 N NaOH or 8 M urea and 0.01 M DDT buffer, pH 7.0, a 70,000 dalton component appears. The latter appears to represent the N-terminal segment of the 130,000 dalton protein as a result of limited proteolysis. Immunochemical studies demonstrated cross-reaction among the 28,000, 70,000 and 130,000 dalton components of the bti toxin, and lack of antigenic similarity with the δ-endotoxins of the sotto and kurstaki subspecies. These observations suggested that the entomocidal proteins of bti are controlled by two structural genes, in distinction to the single-gene control in the other subspecies. Figures 4; references 18: 4 Russian, 14 Western.

12172/9835
CSO: 1840/503

UDC 577.113.6:577.218

ENZYMATIC SYNTHESIS OF GENETIC ELEMENTS FOR EXPRESSION OF SYNTHETIC GENES IN BACILLUS SUBTILIS

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 12, No 5, May 86
(manuscript received 11 Jul 85; in final form 2 Oct 85) pp 647-654

[Article by Yu.A. Gorbunov, N.K. Danilyuk, A.A. Ilyichev, V.N. Krasnykh, A.I. Lomakin, S.G. Popov and S.N. Shchelkunov, All-Union Scientific Research Institute of Molecular Biology, Koltsovo, Novosibirsk Oblast]

[Abstract] Enzymatic synthesis was employed to produce regulatory elements for translation and transcription of the alpha-amylase gene of Bacillus amyloliquefaciens, in order to use them for expression of human alpha-2 leukocytic interferon gene in B. subtilis. The oligodeoxyribonucleotides were synthesized by the phosphotriester method by combination of solid-phase and soluble techniques. Subsequent DNA ligase linking of the fragments containing the SD site led to cloning in the phage M13mp9, and subsequent transfection of competent E. coli JM103 cells. Cloning in plasmid pBR327 led to linking to a promoter fragment. In the final analysis, a plasmid pEMB300 was constructed containing the SD site promoter for alpha-amylase, which may be used to create a system for the expression of various genes in B. subtilis, B. amyloliquefaciens and E. coli cells. The presence of a polylinker fragment from the M13mp9 DNA near the 3'-end of the SD fragment facilitates the linking of this fragment to coding sequences of genes with various sticky ends. Figures 4; references 25: 8 Russian, 17 Western.

12172/9835
CSO: 1840/441

UDC 577.213.7

SYNTHESIS AND CLONING OF DNA FRAGMENT CONTAINING PUTATIVE BINDING SITE FOR EUKARYOTIC mRNA TO RIBOSOMES

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 12, No 5, May 86
(manuscript received 25 Jul 85; in final form 26 Sep 85) pp 655-660

[Article by A.N. Synyakov, O.I. Serpinskiy and N.K. Danilyuk, All-Union Scientific Research Institute of Molecular Biology, Koltsovo, Novosibirsk Oblast]

[Abstract] Solid-phase triester method was used for the synthesis of a series of deoxyribonucleotide sequences, using the potassium salt of 3-nitro-1,2,4-triazole in 18-crown-6 ether as the nucleophilic catalyst. Two polynucleotides with 33 nucleotide residues were used to create a structural unit containing the DNA copy of the nontranslatable fragment of mRNA that precedes the human gamma-interferon gene. The partially complementary deoxyribonucleotides were elongated with DNA-polymerase I to a full duplex. The latter was digested with SalGI endonuclease and cloned in plasmid pUR222. This approach appears to be an efficient method for synthesizing a DNA fragment containing a region homologous to the mRNA binding site for ribosomes. A fragment of this type may be used to prepare recombinant DNA containing various structural genes for subsequent studies on expression. In addition, the fragment could also be used as a specific probe for identifying DNA sequences containing the human gamma-interferon gene via hybridization studies. Figures 2; references 16: 5 Russian, 11 Western.

12172/9835
CSO: 1840/441

UDC 577.123

GIBBERELLIC ACID-INDUCED ALPHA-AMYLASE mRNA OF BARLEY SEED ALEURONE GRAINS: ISOLATION, IMMUNOCHEMICAL PURIFICATION, AND REVERSE TRANSCRIPTION

Moscow BIOKHIMIYA in Russian Vol 51, No 9, Sep 86
(manuscript received 19 Nov 85) pp 1513-1518

[Article by A.G. Artyushevskiy, G.I. Kiryanov, A.M. Kopylov and V.A. Noskov, Laboratory of Molecular Biology and Bioorganic Chemistry imeni A.N. Belozerskiy of the Moscow State University imeni M.V. Lomonosov]

[Abstract] Description is provided of the steps taken to synthesize cDNA corresponding to the mRNA of alpha-amylase, isolated from barley seeds (Hordeum vulgare) following induction with gibberellic acid. The initial step involved raising lapine antibodies against alpha-amylase, isolation

of polysomes from aleurone grains, and the use of the anti-alpha-amylase immunoglobulins for the isolation of poly(A)-mRNA. Reverse transcription of the latter was achieved with avian myeloblastosis virus revertase. Subsequent synthesis of the complementary DNA strand via conventional methods yielded a full-sized double-stranded cDNA. Figures 4; references 17: 1 Russian, 16 Western.

12172/9835
CSO: 1840/509

UDC 577.17

EFFECTS OF MORPHINE TOLERANCE ON OPIATE RECEPTORS IN RAT BRAIN

Moscow BIOKHIMIYA in Russian Vol 51, No 8, Aug 86
(manuscript received 16 Oct 85) pp 1334-1340

[Article by S.V. Zaytsev, M.G. Sergeyeva, O.N. Chichenkov, V.Ye. Petrov and S.D. Varfolomeyev, Laboratory of Molecular Biology and Bioorganic Chemistry imeni A.N. Belozerskiy, Moscow State University imeni M.V. Lomonosov; Chair of Pharmacology of the Therapy and Sanitary-Hygiene Faculty, 1st Moscow Medical Institute imeni I.M. Sechenov]

[Abstract] An analysis was conducted on opiate receptors in the brains of Wistar rats (males, 170-250 g), following long-term morphine administration. Prior to receptor assay, the animals were injected subcutaneously with 10 mg/kg morphine b.i.d for the first 2 days, 20 mg/kg on days and 3 and 4, 40 mg/kg on days 5 and 6, 80 mg/kg on days 7 and 8, and 160 mg/kg on days 9 and 10. Brain membranes were then prepared for studying the binding of ^{3}H-labeled morphine, D-Ala^{2},D-Leu^{5}-enkephalin, and ethylketocyclazone for assessing the activities of μ, δ, and κ receptors. Kinetic studies on receptors of both control and morphine-tolerant animals revealed considerable individual variability in terms of the dissociation constant (K_d) and the receptor concentration (Q) parameter. However, the ratio Q/K_d demonstrated less variability in both groups. Analysis of the Q/K_d values revealed that, with the onset of morphine tolerance, the Q/K_d value decreased 2-fold for the δ receptors, while no significant changes were apparent for the κ or μ receptors. These observations demonstrated that development of tolerance to morphine in Wistar rats was accompanied by changes in the δ receptors for endogenous opiates. Figures 2; references 15: 4 Russian, 11 Western.

12172/9835
CSO: 1840/508

UDC 577.151.64

ENZYMATIC MECHANISMS OF XENOBIOTIC DETOXICATION IN INSECT RESISTANCE TO INSECTICIDES

Moscow BIOKHIMIYA in Russian Vol 51, No 3, Mar 86 (manuscript received 10 Jun 85) pp 420-425

[Article by I.N. Leonova, S.V. Nedelkina, N.B. Naumova and R.I. Salganik, Novosibirsk Section of the All-Union Scientific Research Institute of Chemical Plant Protection; Institute of Cytology and Genetics, Siberian Department, USSR Academy of Sciences, Novosibirsk]

[Abstract] An evaluation was conducted on the activity of cytochrome P-450-dependent monooxygenases, glutathione S-transferases and nonspecific esterases in relation to the resistance of Musca domestica to various classes of insecticides. The basic results of enzyme activity determination demonstrated that, for example, the activities of microsomal monooxygenases in flies resistant to tetramethrin and mecarbenyl were 2.3- to 2.7-fold higher than in susceptible houseflies. In addition, in the resistant flies, the CO maxima on differential spectra of cytochrome P-450 showed a hypsochromic shift by 1-2 nm to 450-451 nm, with the exception of flies resistant to chlorophos. Analysis of multiple molecular forms of nonspecific esterases revealed different electrophoretic patterns for resistant and nonresistant flies, with the resistant houseflies also characterized by elevated glutathione S-transferase activities. These findings emphasize the importance of genetic factors, selection, and the nature of the insecticide in insect susceptibility to insecticides. Figures 1; references 34: 3 Russian, 31 Western.

12172/9835
CSO: 1840/503

UDC 577.151.64

ENZYMATIC DETOXICATION SYSTEMS FOR INSECTICIDES IN COLORADO BEETLES

Moscow BIOKHIMIYA in Russian Vol 51, No 3, Mar 86
(manuscript received 16 Jun 85) pp 426-431

[Article by I.N. Leonova, S.V. Nedelkina and R.I. Salganik, Novosibirsk Section of the All-Union Scientific Research Institute of Chemical Plant Protection; Institute of Cytology and Genetics, Siberian Department, USSR Academy of Sciences, Novosibirsk]

[Abstract] A study was conducted on the ontogenic aspects of enzymes important in metabolic detoxication of insecticides in the colorado beetle, as well as sex differences in enzyme activities. Analysis of microsomal

monooxygenases, nonspecific esterases, and glutathione S-transferases revealed significant differences with respect to the stage of development and sex. The activities were generally higher in males than females and in mature forms as opposed to the larvae, with the latter showing an increase in activity with age. The insecticide 1-naphtholenol methylcarbamate was more toxic to the larvae than the imagos, and twice as toxic to the female beetles than to the males. Such metabolic differences constitute a point of departure for the selection of appropriate pesticides for optimum insect control. Figures 1; references 29: 6 Russian, 23 Western.

12172/9835
CSO: 1840/503

UDC 577.352.46

TRANSPORT MECHANISM OF ^{14}C-β-PHENYLETHYLAMINE IN RAT BRAIN SYNAPTOSOMES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 392, No 6, Feb 87 (manuscript received 17 Jul 86) pp 1494-1497

[Article by S.I. Zharikov, A.D. Zharikova and A.Yu. Budantsev, Institute of Biological Physics, USSR Academy of Sciences, Pushchino, Moscow Oblast]

[Abstract] Two possible mechanisms for penetration of β-phenylethylamine (β-PEA) into nerve termini have been proposed: according to one, lipophilic β-PEA's penetration is taking place via passive diffusion; according to the other--β-PEA enters dopaminergic nerve termini by its concentration gradient by means of a membrane carrier bringing about reversed capture of dopamine into the nerve ends. Because experimental support for either of these mechanisms has been weak, an attempt was made to verify this question experimentally. It was shown that accumulation of ^{14}C-β-PEA into synaptosomes does not occur by the route of active transport but by the mechanism of diffusion. The nature of the membrane component responsible for transport of ^{14}C-β-PEA through synaptosomal membrane is not yet clear but it is independent of the transport system for monoamine neuromediators. β-PEA manifests its action not by blocking the dopamine transport system but by intensified liberation of endogenous dopamine from nerve termini which in its turn competes with tagged dopamine for a site on the membrane carrier. Figures 2; references 15: 1 Russian, 14 Western.

7813/9835
CSO: 1840/524

UDC 57.043:547.422

BIOLOGICAL AND CRYOPROTECTIVE EFFECT OF 1,2-PROPANEDIOL

Kiev KRIBIOLOGIYA in Russian No 2, Apr-Jun 86 (manuscript received 9 Apr 85) pp 20-23

[Article by M.M. Loyevskiy and A.M. Belous, Institute of Problems of Cryobiology and Cryomedicine, Ukrainian SSR Academy of Sciences, Kharkov]

[Abstract] Studies of the effectiveness of 1,2-propanediol in cryoconservation of blood cells have shown that the compound is a promising cryoprotector. This article discusses the metabolism of 1,2-propanediol, a possible intermediate compound in the metabolism of acetone, and the effect of 1,2-propanediol on the body. The compound has low toxicity and can participate in the synthesis of glucose, causing an increase in liver lipid concentration and decrease in ESR, a decrease in blood leukocytes and reduced glutathione level. This substance has the properties necessary to achieve a cryoprotector effect. The stability of the amorphous state of its aqueous solutions is much higher than that of other cryoprotectors. The effectiveness of 1,2-propanediol in conservation of various cells has been demonstrated. References 5: 2 Russian, 3 Western.

6508/9835
CSO: 1840/535

UDC 57:536.48.047.615.9.06

EFFECT OF HYDROXYETHYLATED POLYOLS ON LABORATORY ANIMALS

Kiev KRIOBIOLOGIYA in Russian No 2, Apr-Jun 86 (manuscript received 6 Dec 83) pp 26-29

[Article by L.A. Verkhovskaya, N.S. Sigal, V.F. Kartashov, V.M. Guchok and V.K. Mazalov, Institute of Problems of Cryobiology and Cryomedicine, Ukrainian SSR Academy of Sciences, Kharkov]

[Abstract] The influence of hydroxyethylated polyols on laboratory animals is studied, in view of the promise of these compounds for low temperature conservation of various biological objects. The authors studied hydroxyethylated derivatives of ethylene glycol, glycerin and pentaerythrite, determining the mean lethal dose and pathomorphologic and histologic effect of the substances on laboratory animals. This article reports on the toxicopharmacologic properties of hydroxyethylated glycerins with mean molecular weight 312 and 1412 in experiments performed on chinchilla rabbits, white rats, mice and cats. The general condition of the animals, their behavior, feeding, body mass dynamics, peripheral blood indicators and liver and kidney function were studied. It was found that repeated parenteral

administration of hydroxyethylated glycerin at one-tenth and one-twentieth LD_{50} could cause brief primary decompensation, while higher concentrations increased the changes observed, though they remained transient. The threshold of harmful effect of hydroxyethylated glycerin - 1412 was one-fifth LD_{50}. No cumulative properties or species sensitivity were found. References 7: 5 Russian, 2 Western.

6508/9835
CSO: 1840/535

UDC 577.152.1

EFFECTS OF PERFLUORODECALINE AND PERFLUOROTRIBUTYLAMINE ON HEPATIC CYTOCHROME P-450 SYSTEM

Moscow BIOKHIMIYA in Russian Vol 51, No 4, Apr 86 (manuscript received 26 Jul 85) pp 664-667

[Article by T.G. Khlopushina, I.Ye. Kovalev and Ye.M. Lysenkova, Scientific Research Institute for Biological Testing of Chemical Compounds, Kupavna, Moscow Oblast]

[Abstract] Two fluorocarbons--perfluorodecaline (I) and perfluorotributylamine (II)--were tested for their effects on hepatic cytochrome P-450 system, in order to expand the scope of knowledge of I and II with respect to their biological and clinical application. Studies on male (CBA x C57B1)F_1 mice (22-24 g) treated intraperitoneally with either 0.965 g/mouse of I or with 0.935 mg/mouse of II showed induction of cytochrome P-450 with both agents. However, the effects with I were much more pronounced, and were evident for a period of 5 months. With II an initial short-term depression of cytochrome P-450 (days 1-4) was followed by moderate elevation (postinjection weeks 1-3), followed by a return to baseline level by day 30. These observations demonstrated that the chemically-inert fluorocarbons affected the hepatic cytochrome P-450 system. Figures 1; references 13: 5 Russian, 8 Western.

12172/9835
CSO: 1840/504

NERVE CELL COMMUNICATION RESEARCH

Moscow TASS in English 16 Feb 87

[Text] Scientists of the Physiology Institute of the Ukrainian SSR Academy of Sciences detected microscopic canals in the nerve cell membrane of animals and humans. Academician Vladimir Skok, a co-author of the discovery, believes that a flow of "information" from one cell to another travels over them. This is how excitation in the nervous system is transmitted.

Each canal, one of a multitude, can close or open under the influence of chemical compounds generated in the organism. In his interview with a TASS reporter, the scientist explained that a large protein molecule serves as a "door" for the canals.

The institute established as a result of numerous experiments that the protein molecule selectively responds to chemical compounds dispatched to it by a neighboring nerve cell.

Vladimir Skok said that there were a lot of such compounds not only in the animal body. They are present in plants, and they can be made artificially, which means that it is possible to influence, selectively, certain parts of the nervous system. The discovery's great practical significance lies in the fact that it indicates basically new approaches to developing pharmacological preparations for medical practiee.

Academician Skok said that the study had also made possible an explanation of the mechanism of operation of many medical preparations, for instance, ganglioblockers used to treat high blood pressure, ulcers and other diseases.

Today the work of the physiologists was entered into the registry at the USSR Committee for Inventions and Discoveries.

/9835
CSO: 1840/469-E

UDC 612.822

RECEPTORS OF EXCITATIVE AMINOACIDS IN PYRAMIDAL NEURON HIPPOCAMPAL MEMBRANE

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 9, Sep 86
(manuscript received 17 Feb 86) pp 909-919

[Article by N.I. Kiskin, O.A. Kryshtal and A.Ya. Tsyndrenko, Institute of Physiology imeni A.A. Bogomolets, UkSSR Academy of Sciences, Kiev]

[Abstract] L-glutamate (L-Glu) and L-aspartate (L-Asp) excite nerve cells of practically all segments of the mammalian central nervous system. This action is connected with activation of specific receptors on the surface of the CNS neuron membrane. The goal of this study was to determine characteristics of the interaction of these membrane receptors with their principal agonists: L-Glu and A-Asp. Using intracellular perfusion and concentration fixation methods, receptors of excitative aminoacids in the membrane of isolated pyramidal neurons of rat hippocampus were studied. Administration of L-Glu, kainate (KA) and quisqualate (QA) elicited inwardly directed ionic currents with linear volt-ampere relationship and reversible potential of 25 ± 4 mV. Dose response function fitted single site binding isotherms with apparent K_d values of $9.3\cdot10^{-5}$, $5\cdot10^{-4}$, and $1.1\cdot10^{-3}$ M for QA, KA and L-Glu respectfully. It was shown then that two types of receptors exist in the hippocampal pyramidal neuron membrane: L-Asp insensitive (non-NMDA) and NMDA sensitive receptors activated by L-Glu and its analogues. Preliminary evaluation of the neuron properties of other brain segments (striatum, medulla oblongata and cerebellum) showed that this reception system existed in all of them. Figures 8; references 21: 3 Russian, 18 Western (1 by Russian authors).

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CSO: 1840/483

UDC 591.18:594.38:615.781

ACETYLCHOLINE ACTIVATED SINGLE CHLORINE CHANNELS IN LIMNAEA STAGNALIS SNAIL NEURONS

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 9, Sep 86
(manuscript received 30 Dec 85) pp 960-968

[Article by P.D. Brezhestovskiy and A.Ye. Redkozubov, Institute of Experimental Cardiology, All Union Cardiology Scientific Center, USSR Academy of Medical Sciences, Moscow; Institute of Physiologically-Active Compounds, USSR Academy of Sciences, Chernogolovka]

[Abstract] Comparison of amplitude and temporal characteristics of acetylcholine-activated chlorine channels was carried out with spectral analysis of current fluctuations and direct registration of the current on membrane fragments after passage through single channels. Analysis of current fluctuation showed the elementary channel conductivity to be 3.5 pS. Single channel current registration on membrane fragments in "outside-out" configuration showed that these channels have several fractional conductivity substrates. When a concentration was about the same inside and outside, maximal conductivity was 12 pS. Histogram of open channel times could be approximated by two exponents with τ = 4 and 20 ms. Average estimated density of AC activated channels was 10 channels per μm^2. The method of current fluctuation analysis may lead to inaccuracies in evaluation of ionic channels. Figures 6; references 38: 10 Russian, 28 Western (7 by Russian authors).

7813/9835
CSO: 1840/483

UDC 577.352.465

4-METHYL- AND 4-ETHYLBICYCLOPHOSPHATES--CHLORINE ION CHANNEL BLOCKERS

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 9, Sep 86
(manuscript received 17 Feb 86) pp 968-970

[Article by V.I. Fetisov, A.Ye. Redkozubov, V.S. Lyubimov, V.B. Sokolov and I.V. Martynov, Institute of Physiologically-Active Compounds, USSR Academy of Sciences, Chernogolovka]

[Abstract] The effect of bicyclophosphates (BCP) on γ-aminobutyric acid independent Cl^- dhannels was studied by intracellular determination of the potential and registration of single channels. Gigantic neurons of Limnaea stagnalis snails were used in these experiments. They possess systems of potential- and acetylcholine activated Cl^- channels. It was shown that 4-ethylbicyclophosphate and 4-methylbicyclophosphate blocked, reversibly,

both types of Cl^- channels. When CsCl was replaced by KCl, BCP showed no effect on K^+ channels, blocking only the Cl^- channels. Thus, it was shown that BCP is a highly effective blocker of potential and chemically controlled Cl^- channels. Figures 2; references 14: 6 Russian, 8 Western (1 by Russian authors).

7813/9835
CSO: 1840/483

UDC 577.1:612.744:547.963.3

EFFECTS OF CARBOSTIMULIN ON ACID-BASE BALANCE OF RACING HORSES IN RELATION TO EXERCISE

Kiev UKRAINSKIY BIOKHIMICHESKIY ZHURNAL in Russian Vol 58, No 1, Jan-Feb 86 (manuscript received 5 Mar 85) pp 83-85

[Article by M.I. Kalinskiy, O.V. Kamenetskaya, L.G. Skorik and G.N. Tishchenko, Kiev Institute of Physical Culture; Institute of Biochemistry imeni A.V. Palladin, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] Blood chemistries were performed on race horses before and after exercise to assess the effects of per os carbostimulin (20 g/100 kg for 10 days) on acid-base balance. Studies with 8.7 $\pm$ 0.7 year-old horses racing for 3.2 $\pm$ 0.5 years demonstrated that carbostimulin increases the alkaline reserve in horses at rest, and was also effective in preventing acidosis during a race. These observations point to the utility of carbostimulin in controlling metabolic acidosis and, thereby, preventing muscle fatigue in horses, and as a factor that could increase the efficiency of training. References 16: 12 Russian, 4 Western.

12172/9835
CSO: 1840/498

UDC 577.352.3:547.822.1:577.336

LOCALIZATION OF CALCIUM ANTAGONIST RYODIPINE IN CELL MEMBRANES. FLUORESCENT METHOD STUDY

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 3, No 4, Apr 86 (manuscript received 20 Nov 85) pp 368-375

[Article by G.V. Belevich, G.Ya. Dubur*, M.M. Spirin*, and G.Ye. Dobretsov**, Second Moscow State Medical Institute imeni N.I. Pirogov; *Institute of Organic Synthesis, LaSSR Academy of Sciences, Riga; **Scientific Research Institute of Physical-Chemical Medicine, RSFSR Ministry of Health, Moscow]

[Abstract] The method based on radiation free-energy transfer between fluorescent compounds was used to study interaction with cell membranes of a

Ca^{++} channel blocking agent ryodipine (2,6-dimethyl-3,5-dimethoxycarbonyl-4-(o-difluoromethoxyphenyl)-1,4-dihydropyridine). Two fluorescent probes were used: DSM [4-(p-dimethylaminostyryl)-1-methylpyridinium] and DSP-12 [4-(p-dimethylaminostyryl)-1-dodecylpyridinium]. It was shown that ryodipine penetrates through the lumphocytes and macrophages plasma membranes and could be detected in the intracellular membranes including mitochondria. Ryodipin expressed its Ca transport inhibitory action on the level of plasmatic membrane as well as on the intracellular organelles storing Ca^{++}. The already-discovered in vitro activity of ryodipine can also occur in vivo. Figures 7; references 21: 11 Russian, 10 Western (1 by Russian authors).

7813/9835
CSO: 1840/478

UDC 557.112.6:591.513/577.123:597.553.2

EFFECTS OF NEUROPEPTIDE $ACTH_{4-7}Pro-Gly-Pro$ ON CONDITIONED REFLEXES AND NUCLEIC ACID AND PROTEIN METABOLISM IN YOUNG ATLANTIC SALMON BRAIN

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 292, No 4, Feb 87 (manuscript received 23 Sep 86) pp 1002-1006

[Article by L.V. Vitvitskaya, L.S. Bikbulatova, S.I. Nikonorov and R.I. Kruglikov, Institutes of General Genetics imeni N.I. Vavilov and of Higher Nervous Activity and Neurophysiology, USSR Academy of Sciences, Moscow]

[Abstract] The effects of the ACTH analog $ACTH_{4-7}Pro-Gly-Pro$ (I) were evaluated in terms of a light-avoidance conditioned reflex and nucleic acid and protein metabolism in the brains of 2 year-old Atlantic salmon. The fish were exposed to a water concentration of I of 100 µg/liter, and tested on the first and second day of exposure. The data showed that exposure to I led to a statistically significant increase in the number of correct responses, requiring fewer reinforcements. In addition, both RNA synthesis and protein synthesis were stimulated in the experimental salmon. Incorporation of ^3H-thymidine into DNA on exposure to I showed a decrease within 30 min, and gradual recovery to baseline levels of incorporation by 60 min, suggesting a repair process. These findings demonstrated the need for further comparative studies on the effects of neuropeptides on the piscine CNS to complement the information available on the higher vertebrates. In addition, such effects should be analyzed from the viewpoint of fish husbandry. References 10: 7 Russian, 3 Western.

12172/9835
CSO: 1840/476

UDC 612.1

EFFECTS OF THYMOSIN ON TRANSMISSION OF AFFERENT SIGNALS IN RHESUS SOMATOSENSORY SYSTEM

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 292, No 4, Feb 87
(manuscript received 15 May 86) pp 1010-1012

[Article by V.A. Fedan, O.G. Sakandelidze, T.G. Urmancheyeva, V.K. Reshetnyak, N.A. Romanova and V.G. Dolgikh, Institute of Immunology, Central Scientific Research Institute of Reflexotherapy, Moscow; Institute of Experimental Pathology and Therapy, USSR Academy of Medical Sciences, Sukhumi]

[Abstract] Rhesus monkey were employed in a study designed to evaluate the neurotropic effects of thymosin with respect to the somatosensory cortex. The male monkeys, 3-5 years old, were injected with thymosine (i.v., 1 mg/kg) and subjected to electrophysiological analysis of the effects on evoked potentials to nociceptive, tactile, and kinesthetic stimuli. The observations revealed that different functions were affected in different ways. The response to nociceptive stimuli under the influence of thymosin consisted of an initial depression of the positive components of the evoked potentials, followed by enhancement of the positive components. Thymosin inhibited the response to non-nociceptive cutaneous stimuli, and enhanced the kinesthetic response. The preliminary data suggest that thymosin may act in the brain via reaction with enkephalin receptors that are involved in inhibition of painful impulsation. Figures 2; references 7: 5 Russian, 2 Western.

12172/9835
CSO: 1840/476

UDC 577.112

FUNCTIONAL CONTINUUM OF REGULATORY PEPTIDES

Moscow BIOKHIMIYA in Russian Vol 51, No 4, Apr 86
(manuscript received 26 Sep 85) pp 531-545

[Article by I.P. Ashmarin and M.F. Obukhova, Institute of Normal Physiology imeni P.K. Anokhin, USSR Academy of Medical Sciences, Moscow]

[Abstract] A review is presented of the regulatory peptide systems that have been identified to date, ranging from the endogenous opioids to the hormones angiotensin and vasopression, and the immune factors such as tuftsin. The hypothesis is advanced that the peptides in question represent a fine-tuned functional continuum, and are to be analyzed in that context. Consequently, extremely careful interpretations are required in an analysis of a given peptide or system of peptides, in that exogenous are generally administered

in unphysiological concentrations and via unnatural routes. Tables 4; references 149: 27 Russian, 142 Western.

12172/9835
CSO: 1840/504

UDC 612.86:599.323.2

RELATIONSHIP BETWEEN SEROTONIN LEVELS IN OLFACTORY BULBS AND PHEROMONE-BASED AGGRESSIVE BEHAVIOR IN MALE LABORATORY MICE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 292, No 5, Feb 87 (manuscript received 8 Jul 86) pp 1275-1277

[Article by N.A. Dyuzhikova, M.B. Pavlova and S.N. Novikov, Institute of Physiology imeni I.P. Pavlov, USSR Academy of Sciences, Leningrad]

[Abstract] Studies were conducted on (CBA x C57B1/6)F_1 male mice employing the 'standart tester' method [Novotny, M., et al., Proc. Natl. Acad. Sci. USA, 82(7): 2059-2061, 1985], to assess the relationship between serotonin levels of the olfactory bulbs and aggressive behavior mediated by pheromones. A negative relationship was established between the olfactory bulb concentrations of serotonin and aggressiveness (r_s = -0.45 to -0.47; $P < 0.05$). These observations suggest that, in the test model employed, olfactory bulb serotonin is intimately related to aggressive behavior in this strain of mice, and performs a classical inhibitory function. Figures 1; references 15: 5 Russian, 10 Western.

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UDC 591.543.42

STUDY OF CARBOHYDRATE METABOLISM OF LONG-TAILED GROUND SQUIRRELS DURING HIBERNATION

Kiev KRIOBIOLOGIYA in Russian No 2, Apr-Jun 86 (manuscript received 19 Sep 83) pp 29-31

[Article by A.I. Anufriyev, T.N. Solomonova, I.S. Vasilev, L.S. Danilova and A.K. Akhremenko, Yakutsk Affiliate of the Institute of Biology, Siberian Department, USSR Academy of Sciences, Yakutsk]

[Abstract] The ecology of the Yakutsk ground squirrel Citellus undulatus jacutensis Brandt, the northernmost form of the species, has been well studied, but physiological and biochemical changes in the animal have been

little studied. This article studies a number of physiological and biochemical characteristics of the metabolism of the long-tailed ground squirrel during its hibernation: Dynamics of body temperature and weight, blood glucose, glycogen in liver and muscles, vitamin C in liver, spleen, kidneys, adrenal glands, heart, and lactate dehydrogenase [LDH] activity in the muscles, heart, brain, kidneys and liver. During hibernation, hypoglycemia was observed. The level of gluconeogenesis was maintained and the quantity of glucose compensated upon termination of hibernation. LDH activity in the heart and kidneys was higher during hibernation. LDH activity is maximal in the muscles and brain in summer. The ascorbic acid content in the heart increases at the beginning of hibernation and remains high until Spring. A decrease in vitamin C content after hibernation is also characteristic of the adrenal glands. In the spleen, erythropoiesis intensifies at this time and ascorbate content increases. The content in the kidneys is relatively constant throughout hibernation, while the liver has a higher absolute vitamin C content, which remains constant during hibernation, (supporting the Saulich view indicating the synthesis of vitamins during hibernation). The materials demonstrate the economy of physiological and biochemical processes in the tissues during hibernation. Figures 1; references 5: 4 Russian, 1 Western.

6508/9835
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UDC 612.822.1:612.57

CONTENT OF HOMOCARNOSINE IN THE BRAIN OF NONHIBERNATING AND HIBERNATING ANIMALS UPON COOLING

Kiev KRIOBIOLOGIYA in Russian No 2, Apr-Jun 86 (manuscript received 15 Nov 8? year not given) pp 34-36

[Article by Kim En Ryul and E.Z. Emirbekov, Dagestan State University, Makhachkala]

[Abstract] A study is made of the quantitative distribution of the neuromediator homocarnosine in various areas of the brain of hibernating and nonhibernating animals upon hypothermia. Experiments were performed on laboratory white rats and small susliks (Citellus Pygmaeus Pallas) trapped in Dagestan. The content of homocarnosine was studied at body temperature 20°C (animals were immersed in water at 4-5°C) and, for the susliks, at 10°C. Hypothermia (20°C) resulted in a drop in the content of homocarnosine in the rat brain by 14-21%. Maintenance of the hypothermia for two hours caused a significant decrease in the concentration of the dipeptide in the brain. The decrease in content of homocarnosine in the rat-brain segments upon hypothermia was inversely proportional to the regional distribution of the dipeptide under normal conditions. Chilling of the susliks to 20°C caused a decrease in the content of homocarnosine almost

identical to that observed in the rats. Further cooling of the susliks to 10°C did not change the dipeptide levels observed at 20°C. The decrease in the content of homocarnosine in brain structures upon cooling of the body is considered to be one cause of pathology upon hypothermia. Homocarnosine is apparently not an inhibiting neuromediator under conditions of hypothermia. References 7: 5 Russian, 2 Western.

6508/9835
CSO: 1840/535

MALPRACTICES AT USSR ACADEMY OF SCIENCES INSTITUTE

Moscow SOVETSKAYA ROSSIYA in Russian 26 Apr 87 p 6

[Editorial Report] Moscow SOVETSKAYA ROSSIYA in Russian 26 April 1987 first edition carries on page 6, under the headline "An End to the Plot of the Indifferent" a 4,000-word unattributed roundup on the repercussions of an article published in the paper for 18 March under the title "A Substitute for Honor." The 18 March article detailed the falsification of information, deception, and flouting of moral and legal norms in the development and clinical testing of a new blood substitute at the USSR Academy of Sciences Institute of Biophysics. The roundup quotes at length from the transcript of proceedings at an open party meeting held at the Institute 2 April 1987 to discuss the affair. It goes on to quote a number of official responses, concluding with the following from USSR Deputy Prosecutor General I. Chermenskiy:

"On 18 March 1987 SOVETSKAYA ROSSIYA published an article entitled "A Substitute for Honor."

"On the basis of the facts published in the said article, the USSR Prosecutor's Office has instituted criminal proceedings.

"A number of officials of the USSR Academy of Sciences Biophysics Institute and USSR Ministry of Health Medical establishments who, in violation of established rules, engaged in laboratory tests on people of medical preparations not passed for this purpose by the USSR Ministry of Health Pharmacological Committee are under investigation."

/9835
CSO: 1840/801-F

BLOOD DONATION IN TAJIK SSR

Dushanbe KOMMUNIST TADZHIKISTANA in Russian 19 Feb 87 p 3

[Article by B. Rozin, correspondent]

[Abstract] Blood donors first appeared in Tajikistan in 1929 and the first official center of blood transfusion was opened in 1932 in Dushanbe. The number of donors increases annually; many are repeat donors, some having given in excess of 50 liters of blood. Normally about 2 hours are necessary for collection of 200-400 ml of blood, but with good organization a half hour could be cut out of this time. Some of the problems faced by the workers in the collection station are: very old, crowded facilities (there is not enough room for separate dressing facilities); rather than building modern units, the old ones are patched up. Many employers do not allow time off to their workers to give blood. The blood collection center is opened only between 10 AM and 1 PM and during this time some of the employees are taking time out for lunch. There is no patient education program available at such stations.

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EFFECTS OF FRACTIONATED PULSED RED LASER ON SPLEENS OF INTACT AND X-IRRADIATED MICE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 292, No 4, Feb 87 (manuscript received 14 Aug 86) pp 993-996

[Article by N.S. Samokhvalova, Institute of Evolutionary Morphology and Ecology of Animals imeni A.N. Severtsov, USSR Academy of Sciences, Moscow]

[Abstract] An evaluation was conducted on the combined effects of neon/helium laser treatment followed by x-irradiation on the cytological status of spleens in outbred male and female mice (18-25 g). The animals were exposed to the red laser (632.8 nm, 3.5 mW/cm^2, 3 sec exposure at 7 sec intervals, 20-40 pulses/fractional dose) and then subjected to 1.75 Gy. The data demonstrated that a single treatment (20 pulses) potentiated the adverse effects of x-irradiation in terms of an increase in aberrant cells and the mitotic index. However, higher fractional doses of the red laser attenuated the effects of x-rays. The optimal protective effects of red laser treatment were observed in animals in which the epigastric region was subjected to lasers in the fractional pulsation mode, in combination with an interval between the laser treatment and x-irradiation not exceeding a single period of the mitotic cycle of the hemopoietic splenic cells. References 12 (Russian).

12172/9835
CSO: 1840/476

USSR-HUNGARIAN MEDICAL EQUIPMENT FIRM: PLANS AND PRODUCTS

Moscow MEDITSINSKAYA GAZETA in Russian 30 Jan 87 p 3

[Article by L. Novikov, interviewer]

[Abstract] The article is an interview with Professor, Doctor of Technical Sciences V.A. Viktorov, director of the All-Union Scientific Research Institute of Medical Instrument Building (VNIIMP). Viktorov answered questions about the enterprise "Mikromed" which has been founded by VNIIMP and Hungary's "Medikor" firm.

"Mikromed" was created for the purpose of speeding the introduction of new microprocessor-based medical technology, particularly diagnostic equipment, in countries of the socialist bloc, according to Viktorov. The enterprises will use existing production facilities of "Medikor". Viktorov said the Hungarian firm's products have been 'oriented' chiefly on a Western component base in the past, but now "Mikromed" will produce equipment based on the latest achievements of Soviet and Hungarian specialists. Training courses on how to use the enterprise's products are to be organized for Soviet physicians at an affiliate of "Mikromed" which will open in Moscow next year.

Asked about the types of equipment in which the enterprise will specialize, Viktorov said unified modular microprocessor equipment will be the main product line of "Mikromed". Its component base will be products of socialist countries, and primarily of the USSR. A number of instruments and systems are to be developed for mass preventive-medical examinations of the population.

Viktorov noted, in conclusion, that "Mikromed" has already begun to offer maintenance services for medical computer technology. They are contracted through the All-Union Association for the Sale, Installation and Repair of Medical Equipment.

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